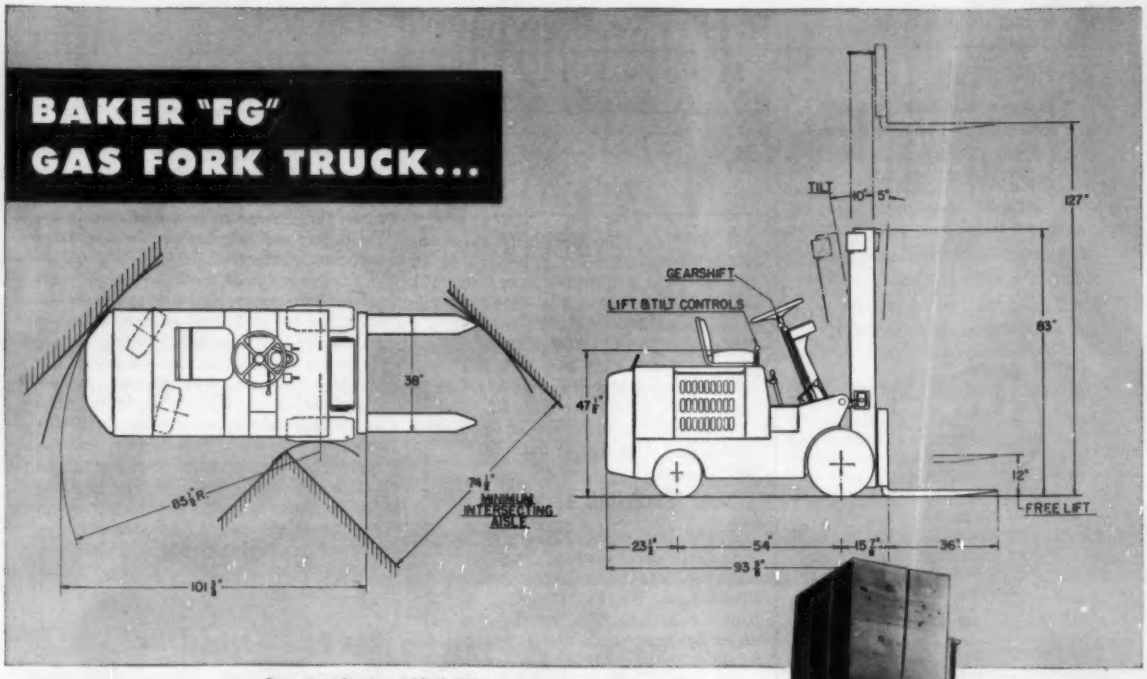
BAKER "FG" GAS FORK TRUCK...



Dimensional Drawing of FG-60, 6000 pound capacity.

why "BALANCED DESIGN" makes it the best!

"Balanced Design" means that every component be engineered to its specific function. Further that all elements be matched and coordinated to work together for top efficiency, maximum dependable service and longest life.

In the "Balanced Design" Baker FG Gas Trucks, for example, you get an integrated power train, consisting of drive axle, transmission and clutch, selected and engineered to be the best possible unit to perform its required function. Features include: compact rigid construction without troublesome universal joints, split clutch housing for easy accessibility, and *single oil supply for entire assembly.*

"Balanced Design" also assures you that the power plant is not merely an automotive engine modified for truck use. It is a heavy-duty industrial engine specially engineered for rugged industrial truck service and built by an outstanding manufacturer. Our specifications call for moving parts to balance much closer than ordinary engine parts: pistons balanced to ± grams instead of ounces, crankshaft to 4 inch-ounces and connecting rods to 2 grams.

These are some of the reasons why Baker "FG" is the only gas fork truck with a full 6 months' warranty, and why we say "BALANCED DESIGN" makes it the best.

Baker "FG" gas fork trucks are available with 3,000, 4,000, 5,000 and 6,000 pound capacities. Specific bulletins can be obtained by writing The Baker-Raulang Co., 1251 West 80th Street, Cleveland 2, Ohio.

8 REASONS WHY THE BAKER FG FORK TRUCK IS FIRST IN ITS CLASS...

1. **LOWER INITIAL COST**—FG-40 (4000 lb.) $4295. Other models at proportionate savings.
2. **LONGER WARRANTY PERIOD**—Baker quality permits full 6 months warranty.
3. **HIGHER LIFT**—Mast design allows higher standard lift than ordinary trucks.
4. **LOWER MAINTENANCE COSTS**—Designed for easier and less frequent servicing.
5. **MORE MANEUVERABLE**—Short turning radius cuts aisle width, adds floor space.
6. **EASIER TO OPERATE**—Greater visibility . . . easy-to-work controls.
7. **GREATER STABILITY**—Lower center of gravity, higher "stability factor" ratio.
8. **BETTER BRAKING**—Full floating, self-equalizing, self-energizing brakes.

Baker
HANDLING EQUIPMENT

505

For more facts circle 502 on Reply Card

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'ROUND ABOUT with the editors in field and office

Edited by R. L. Marinello

Plant Engineers Move Up

O. B. Van Hise, formerly chief engineer of the Louisville Branch of P. Lorillard Co., will now take over the position of resident engineer at their Greensboro, North Carolina plant.

Melvin Reich, formerly assistant plant engineer with Mr. Van Hise will now take over the duties of chief engineer of the Louisville Branch.

Both men are members of the Louisville Plant Engineers' Society.

Master Mechanic at J&L

D. W. Ferguson has been promoted to master mechanic of the new Continuous Galvanizing Department of the Pittsburgh Works Division of the Jones and Laughlin Steel Corp. He formerly served as assistant general foreman, electrical.

Mr. Ferguson came to Jones and Laughlin in August, 1948, from General Electric Corp. He is an Electrical Engineering graduate of the University of West Virginia.

Conference Dates

INSTRUMENTATION Paces Automation will be the theme of the 10th Annual Instrument-Automation Conference and Exhibit to be held September 12 to 16 at the Los Angeles Shrine Exposition Hall and Auditorium.

Technical meetings during the conference will include clinics and panel discussions on a variety of subjects. Included will be a Maintenance Clinic with more than 20 companies participating; a nine-section Analytical Clinic; and, for the first time, a Computer Workshop which has attracted much interest; and a Data Handling Symposium for the exchange of information on data handling systems which are finding increasing use in business as well as in the laboratory and the plant.

Course in Materials Handling

NEW AWARENESS of the importance of the fields of materials handling and industrial packaging is demonstrated by a course recently established at The Industries Training School at Stevens Institute of Technology, Hoboken, New Jersey.

The course, which will begin on September 26, will be taught during the evening by Walter F. Friedman, senior engineer of Container Laboratories, Inc., New York City, consulting and testing firm. Mr. Friedman is a specialist in the packaging and shipping problems of large and small industries.

The group will meet one night each week. The course is open to people interested in applying new concepts of packaging and materials handling in such fields as production, warehousing and shipping. Topics will include modern techniques of automation, palletized shipments, car-loading, various types of containers, packaging machinery, carrier regulations and package testing methods.

Registration for the materials handling course ends on September 19. Additional information may be obtained from the Director of the Industries Training School, Fifth and River Streets, Hoboken, New Jersey.

New Plant Engineer

John A. Gilroy will take over the duties of plant engineer at Harnischfeger Corporation's main plants in Milwaukee.

Prior to joining P&H, Mr. Gilroy was for 13 years chief engineer for the Wyman-Gordon Co. at Harvey, Illinois. He is a graduate of Purdue University in Mechanical Engineering. Mr. Gilroy succeeds Mr. William Hitzelberger upon the latter's retirement.

Noise Abatement Contest

IT'S TIME again to think of the Awards of Merit certificates which will be made by the National Noise Abatement Council to industries, associations, societies and individuals for significant contribution to noise abatement.

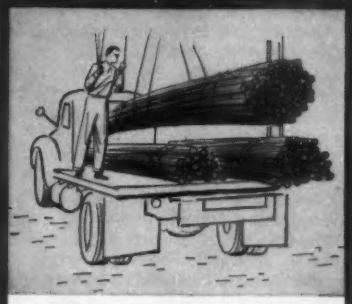
Eligibility classifications of those qualified to compete for the Awards of Merit certificates are as follows:

Industry: For outstanding service in behalf of noise abatement for the development or improvement of: A product, equipment or device; and noise abating or sound absorbing material.

Installations: For the accomplishment of an outstanding service in the interest of noise abatement by reason of design and/or use of materials, equipments and devices in an architectural or industrial installation of substantial importance.

Research projects or special studies:

Subscriptions: U.S.A. $10, Canada $11. Other countries $12 per year. Single copies $1. Change of Address: Send to PLANT ENGINEERING, Circulation Division, Barrington, Illinois. Please supply position title, company name, company address. Request must reach us by 15th of month to make the change effective with following month's issue. Published monthly and accepted as controlled circulation publication at Chicago, Ill.

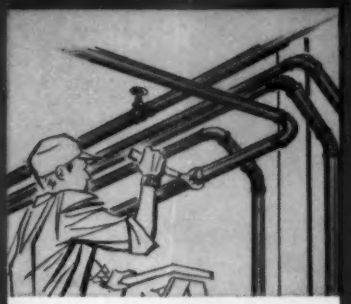


1. Cost of Pipe

The important thing about this cost is that it represents only *one small part* of the piping picture and should not establish the only pipe comparison guide.

2. Cost of Installation

This cost generally represents the *major part of the piping investment* and includes labor, fabrication, valves, fittings, covering, and overhead.



3. Cost of Maintenance

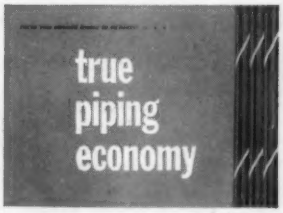
This is the money paid to keep the piping system in operation as long as the need for it exists. The amount spent depends largely on the quality of pipe used.

3 IMPORTANT COSTS THAT SHOW WHY WROUGHT IRON PIPE PROVIDES TRUE PIPING ECONOMY

This breakdown of piping system costs underscores the reasons why wrought iron pipe users enjoy maximum piping economy even though they pay more, *initially*. These users know that they buy an *installed piping system*, not just the pipe. And because the greatest cost of this installed piping system is in labor, valves, fittings, fabrication, covering, and overhead, the difference between the cost of the wrought iron installation and what a low-first-cost pipe installation would have been, shrinks to an insignificant amount in the cost of the *total piping contract.*

But still more important to the plans and pocketbooks of wrought iron pipe users is the Cost of Maintenance. One user put it this way. "A wrought iron installation is like having money in the bank." He was simply expressing wrought iron's longer service in terms of money saved in repairs, replacement, and maintenance. There's no doubt about it . . . when you consider the three costs, you can buy the best—wrought iron—and get a bargain at the same time.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Boston, New York, Philadelphia, Washington, Atlanta, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N. Y. *Available throughout the world.*



Write for Booklet

The booklet, *True Piping Economy*, gives detailed information on the cost facts presented here, plus many others. You will find it a valuable guide in placing pipe selection emphasis where it will profit you most.

BYERS

CORROSION COSTS YOU MORE THAN WROUGHT IRON

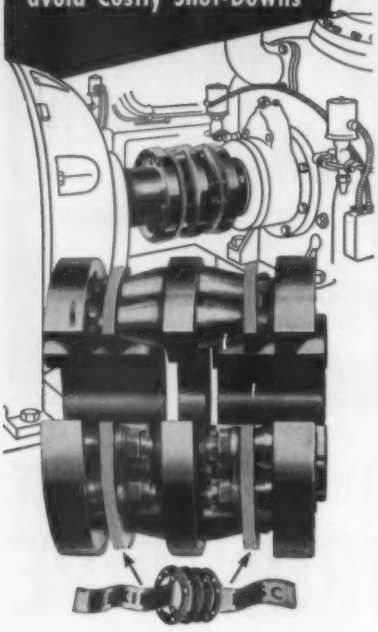
WROUGHT IRON

TUBULAR AND HOT ROLLED PRODUCTS

ELECTRIC FURNACE QUALITY STEEL PRODUCTS

For more facts circle 503 on Reply Card

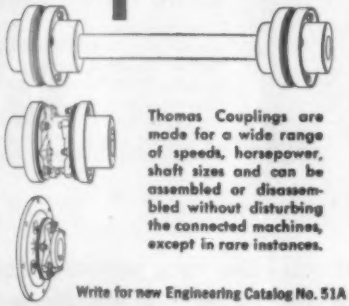
Specify THOMAS ALL METAL
FLEXIBLE COUPLINGS
for Power Transmission to avoid Costly Shut-Downs



Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES

FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.



Thomas Couplings are made for a wide range of speeds, horsepower, shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.

Write for new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING CO.
WARREN, PENNSYLVANIA, U.S.A.

For more facts circle 504 on Reply Card

'ROUND ABOUT

For outstanding effort in behalf of noise abatement through the promotion of research projects or other means of Trade Associations, Technical Societies or others which, through their undertaking, bring benefits to industry and the general public.

Decisions of the Awards Committee will be based on concrete evidence submitted by companies and others showing that they have made noteworthy contributions to noise abatement.

Information concerning rules and regulations for the Award of Merit competition may be obtained from the National Noise Abatement Council, 36 West 46th Street, New York, N. Y.

Fire Safety Standards

THREE NEW and revised fire safety standards applying to spray finishing using flammable materials, tank trucks for flammable liquids, and storage and handling of liquefied petroleum gases have just been published by the National Fire Protection Association.

The Standards, by numerical designation and title, are: No. 33, Spray Finishing Using Flammable Materials (30 pp), price 35 cents; No. 385, Recommended Regulatory Standard for Tank Vehicles for Flammable Liquids (18 pp), price 35 cents; and Standards for the Storage and Handling of Liquefied Petroleum Gases (78 pp), price 35 cents.

Copies of these standards may be obtained by writing to the National Fire Protection Association, 60 Batterymarch St., Boston 10, Massachusetts.

New Industrial Plants

Johns-Manville Corp. will begin construction of a large new insulating board plant at North Bay, Ontario. The plant with 150,000 sq ft floor space will have an initial annual capacity of 75 million sq ft of insulating board . . . A multi-million dollar transformer and circuit breaker manufacturing expansion program at the Terre Haute, Indiana, and Gadsden, Alabama, plants of **Allis-Chalmers Mfg. Co.** are being planned . . . **Motorola, Inc.**, recently broke ground for a new one and one-half million dollar transistor manufacturing facility in Phoenix, Arizona. Construction plans call for the erection of a concrete and masonry, one-story building, containing 57,600 sq ft of usable space . . . **Rockwell Manufacturing Co.** is constructing a new parts plant in Russellville, Kentucky. The new one-story building, 104,000 sq ft of space, will have an exterior of masonry and insulated aluminum panels, and interior walls of glazed tile. It will be entirely heated and cooled with gas. Cost will be in excess of one million, exclusive of production equipment . . . A new **Westinghouse Electric Corp.** manufacturing plant will be built at Youngwood, Pa. The new multi-million dollar plant will manufacture semiconductor devices such as transistors, power rectifiers, high frequency detectors and photocells . . . A modern, single-story building which will eventually encompass over a half million square feet of plant and office space has been started at Jackson, Michigan, by **Acme Industries, Inc.** . . . **The American Brass Co.** recently broke ground for its new $2,500,000 Mattoon, Illinois, plant for the manufacture of flexible metal hose and tubing.

Celebrates 50th Anniversary

MATHEWS CONVEYER CO., with main offices in Ellwood City, Pennsylvania, recently combined the celebration of its 50th anniversary with the completion of the broadest expansion program in the company's history.

The building program, which was started in January of 1954 and completed recently, involved a new three-story engineering and office building and two major additions to the plant, which resulted in some 30 per cent increase in manufacturing area.

The additions to the manufacturing area involve a complete new truck shipping dock with hydraulically adjustable platforms, a greatly enlarged sheet metal department and area for the assembly of standardized belt conveyers, and a complete new building for the fabrication of heavy power conveyers.

Guide to Safety

TO HELP industry put its foot in a safe direction, the National Safety Council has prepared a catalog, listing the many accident prevention aids available. Not only the tools needed to build plant safety programs but also the training aids available for instructing supervisors and workers are included.

This 68-page guide provides a list of Council periodicals, newsletters and a complete library of technical and administrative publications covering all phases of occupational accident prevention.

A brief listing of several items in the table of contents will give you an idea of the many subjects covered in this guide: preparing supervisors; safety training films index; electricity; fire and explosion; clothing and protective equipment; tools, hand and portable power; and many others.

Individual copies of the Service Guide 2.1 may be obtained by writing to the National Safety Council, 425 N. Michigan Ave., Chicago 11, Illinois.

For easier and better pipe hanging!

This adjustable swivel hanger attached to a concrete insert is easy to install and will safely carry a wide range of loads. Like all Grinnell Hangers, it permits easy adjustment at any time after pipe is installed . . . to prevent sagging pipe and water traps, and to assure positive drainage. This is just *one* of the ways Grinnell Engineered Pipe Hangers save you maintenance expense, give you a better installation.

A good piping job is too important to jeopardize with improvised or inadequate pipe hangers and supports. There's a Grinnell Hanger for every piping requirement. All Grinnell Hangers comply with piping code specifications.

CB-UNIVERSAL CONCRETE INSERT (Fig. 282) . . . Used for pipe lines up to 12 inches where sizes of hanger rods cannot be readily determined in advance of ceiling construction. This insert is cast in one body size only. V-type teeth grip a special removable nut which is ordered separately and can be furnished tapped for ⅜", ½", ⅝", ¾" or ⅞" hanger rods. Face of insert can be concealed by ceiling finish.

ADJUSTABLE SWIVEL PIPE RING (Fig. 101) . . . Solid ring of malleable iron. Twelve sizes provide load range of 80 lbs. for ¾" size, to 1510 lbs. for 8" size.

LOCKING SWIVEL SHANK of Fig. 101 Pipe Ring . . . To obtain proper adjustment, swivel shank can be turned easily by hand when the weight of the pipe is temporarily taken off the ring. When weight is returned, swivel shank locks automatically, preventing change of adjustment due to vibration. Wire retaining ring keeps swivel shank and pipe ring or yoke from separating, makes assembly a single unit.

GRINNELL

AMERICA'S #1 SUPPLIER OF PIPE HANGERS AND SUPPORTS

Grinnell Company, Inc., Providence, Rhode Island • Coast-to-Coast Network of Branch Warehouses and Distributors

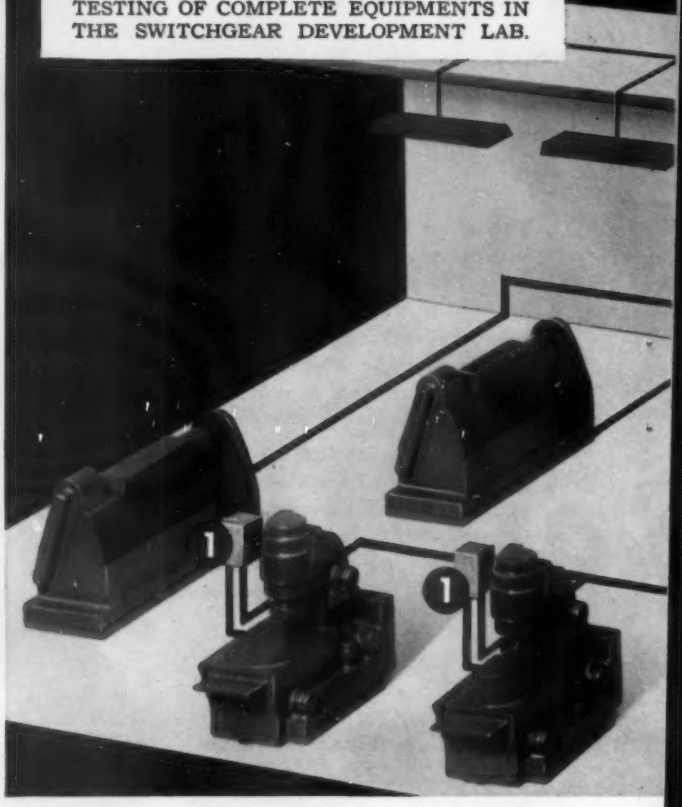
Manufacturer of: pipe fittings • welding fittings • forged steel flanges • steel nipples • engineered pipe hangers and supports Thermolier unit heaters • Grinnell-Saunders diaphragm valves • prefabricated piping • Grinnell automatic fire protection systems

For more facts circle 505 on Reply Card

1. INDIVIDUAL AIR CIRCUIT BREAKERS provide the best protection for control or switching. Particularly suitable for motor control, they can't be "single-phased." Both drawout switchgear and individual breakers have racking device to simplify removal. Ask for Bulletin GEA-5915.

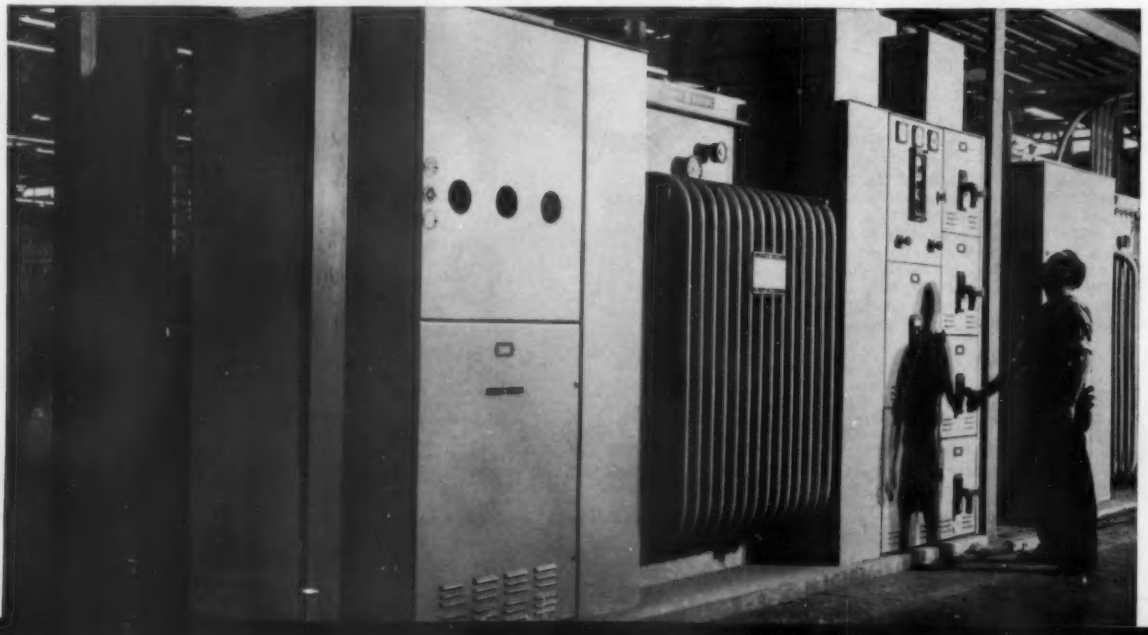
2. DRAWOUT SWITCHGEAR provides a convenient and economical way to locate a number of breakers in one out-of-the-way spot. This conserves valuable floor space and centralizes control. ***These entire equipments*** have been design tested up to maximum short-circuit ratings. Bulletin GEA-5916 gives details.

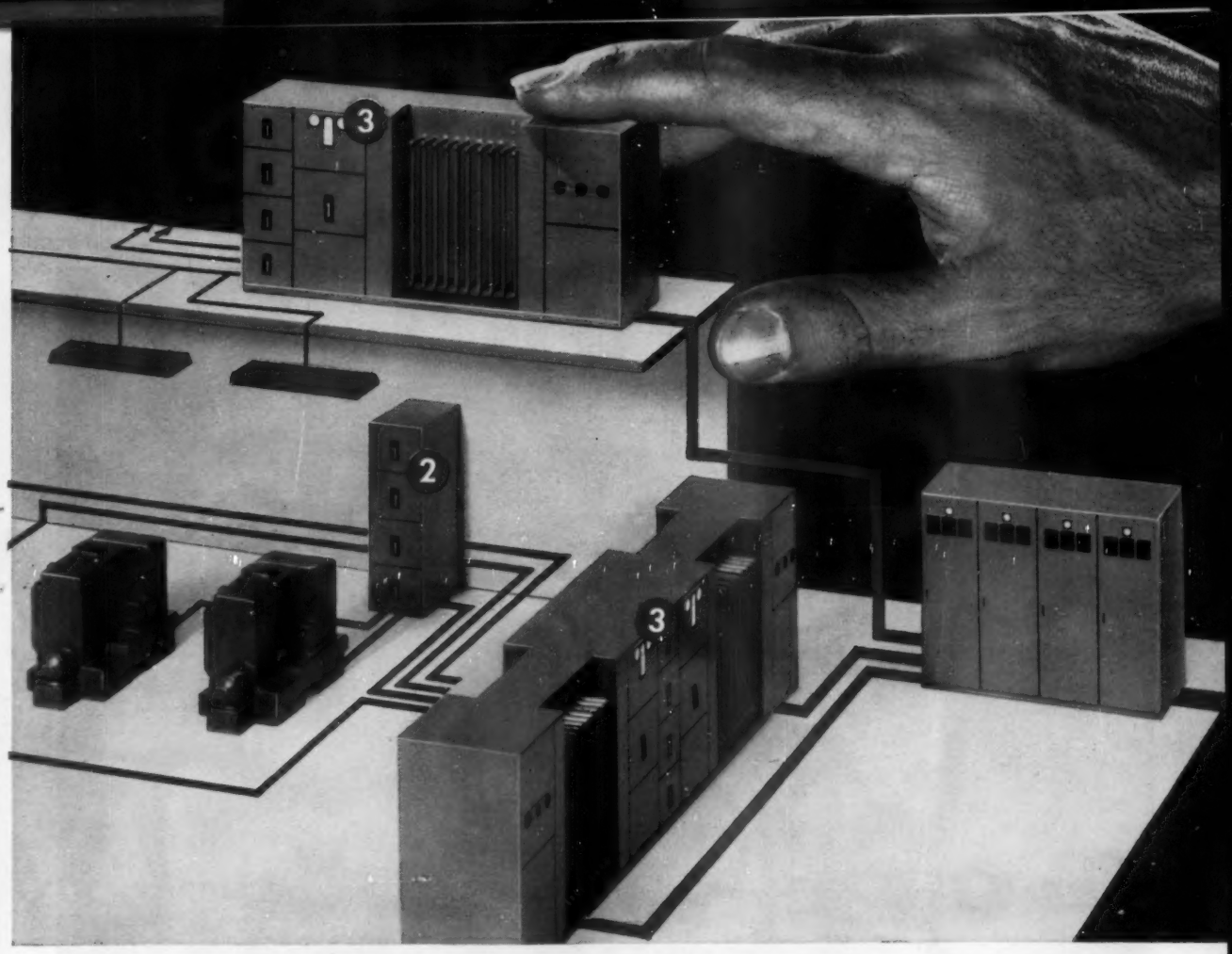
CAN YOU AFFORD A POWER FAILURE AT ANY POINT IN YOUR PLANT? G-E low-voltage switchgear—individual breakers **(1)** drawout switchgear **(2)** and load-center substations **(3)**—is designed to provide maximum protection up to full interrupting rating. This ability is backed up by DESIGN TESTING OF COMPLETE EQUIPMENTS IN THE SWITCHGEAR DEVELOPMENT LAB.



Now... more protection for less cost

3. LOAD-CENTER SUBSTATIONS bring power close to load for most economical distribution. Air circuit breakers are properly co-ordinated with transformer capacity to give optimum protection. For details ask for Bulletin GEA-3592.





at all these vital points...

YOU CAN'T AFFORD ANYTHING LESS THAN THE BEST WITH THE COST OF SWITCHGEAR REDUCED UP TO 33% BY THE INCREASE IN G-E AIR CIRCUIT BREAKER INTERRUPTING RATINGS

THE COST OF POWER DISTRIBUTION SYSTEM PROTECTION IS DOWN—if you are building or modernizing, you can get maximum protection with the right switchgear at about the same price you would have paid for equipment *barely adequate*. You can't afford to let another day go by without being positive that you have complete protection at every vital point in your electrical system. If you have a power system over ten years old, check it now for possible increased short-circuit capacities. Don't risk even a partial power failure when modernizing is so economical.

HERE'S HOW YOU CAN SAVE up to 33% with the recent increase in G-E air circuit breaker interrupting ratings. These increases—25 to 50% for low-voltage applications—permit the use of smaller, and less expensive, breakers at many points in your system . . . in load-center unit substations, drawout switchgear and individually mounted breakers.

CHECK THE PRICE on G-E low-voltage switchgear for your system. You'll be surprised at how favorably it compares with prices on equipment that doesn't offer the same reliability of operation, ease of installation and maintenance, and high degree of safety for personnel.

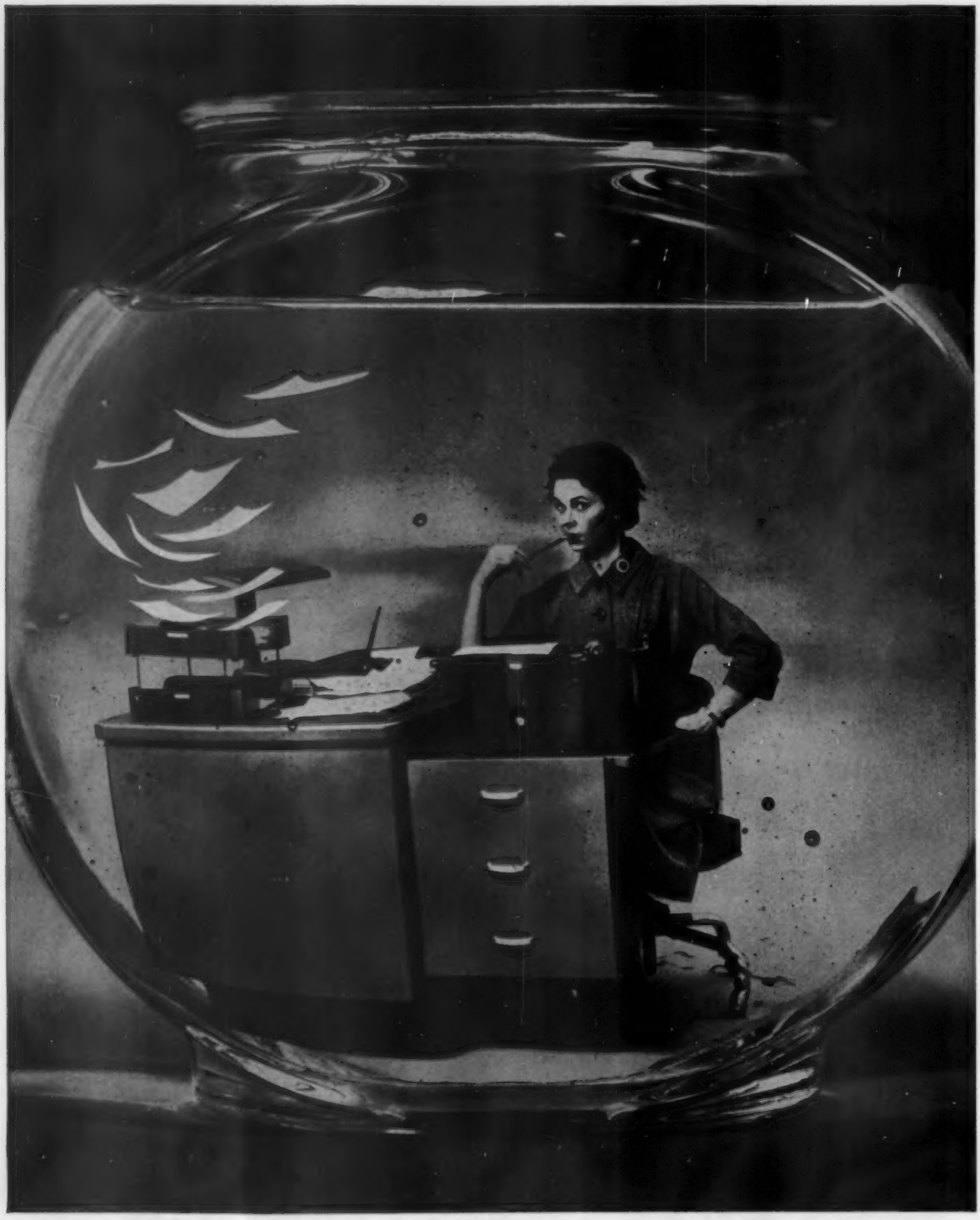
FOR COMPLETE INFORMATION contact your General Electric Apparatus Sales Representative or write to General Electric Company, Schenectady 5, N. Y. 323-3

Progress Is Our Most Important Product

GENERAL ELECTRIC

For more facts circle 506 on Reply Card

Don't let "fish bowl" distractions



cut your employees' efficiency!

Actual test shows work output increased 27% after installation of VMP MOBILWALLS

Plan your plant layout with VMP's modern metal partitioning, and do away with old-fashioned "fish bowl" conditions. MOBILWALLS cut down noise, sharply reduce delays and errors. With the privacy they afford, routines run smoother and work-stopping distractions are virtually eliminated. MOBILWALLS are ideal for every plant, large or small. If you're planning a new one, or remodeling an old one, don't pass up the savings they afford.

We can show you how much others have gained in office efficiency—how much they've cut down on costly delays. We'll demonstrate with Ratio-Delay Studies—accurate reports that rate office efficiency. They show what has been done, let you picture for yourself what can be done in your own plant.

Here's what happened in a large insurance company after MOBILWALLS were installed:

- Office productivity increased 27%.
- Delays, lost motion were cut 48%.
- Time spent paying attention to distractions, and correcting errors, was reduced 38%.
- The VMP MOBILWALLS installation helped in adding as much to work output as could have been added by a 27% increase in employees and payroll expense.

Free folder. Get complete details by writing to Department PE8 for VMP's informative folder . . . detailed data on Ratio-Delay, comparisons of partitioning materials normally used, and other valuable facts.

MODERN STYLING . . . SPEEDY INSTALLATION

VMP MOBILWALLS are smartly designed—ideal for office or factory. Colors are restful and permanent. Surfaces never chip, warp, or crack; they wash clean easily. Erection crews from your own local area install MOBILWALLS in a matter of hours—your employees' routine is uninterrupted. And VMP MOBILWALLS are readily adaptable to floor plan changes—they are easily and quickly moved.

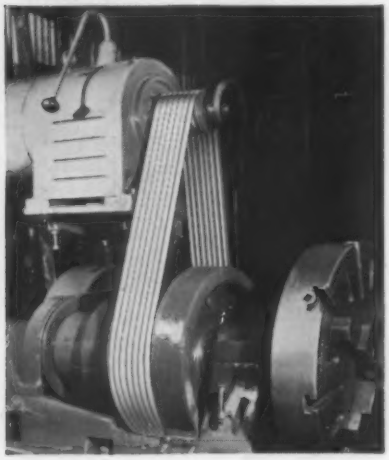
Virginia Metal Products, inc.

ORANGE, VIRGINIA

Subsidiary of Chesapeake Industries, Inc.

For more facts circle 507 on Reply Card

This large lathe was formerly driven by a flat belt which slipped on heavy cuts, stalled and broke tool bits. Savings on broken tool bits alone offset the cost of the drive the first year—and production was increased 25% after the V-belt drive was installed.



concave sides lengthen V-belt life ...cut costs

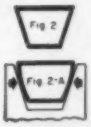
Hundreds of plants that keep track of V-belt drive costs know this: Gates Vulco Ropes . . . the V-belts with *concave sides*...wear much longer and *cost less per year of service.*

Here is the interesting reason why:

When a Gates V-belt bends around the sheave, the *precisely-engineered* concave sides (Fig. 1) fill out and become straight. Thus the sides of the belt make full, uniform contact with the pulley (Fig 1-A).

Naturally, uniform contact distributes the wear *evenly.* And *even* wear means *longer* wear.

Longer wear saves not only on replacement costs; it also saves the cost of down-time... keeps equipment producing.



Simple test proves value of concave sides

Take a straight-sided V-belt (Fig. 2) and bend it. Feel the sidewalls of the belt bulge out as the belt bends. You see immediately that the bulging sides prevent uniform contact with the pulley (Fig. 2-A). Uneven contact causes faster wear...increases your drive replacement costs.

Let the cost-saving longer life of Gates Vulco Ropes contribute to *your* profits. Specify Gates Vulco Ropes—the V-belts with concave sides (U.S. Patent 1813698). The Gates Rubber Co., Denver, Colorado—*World's Largest Maker of V-belts.*

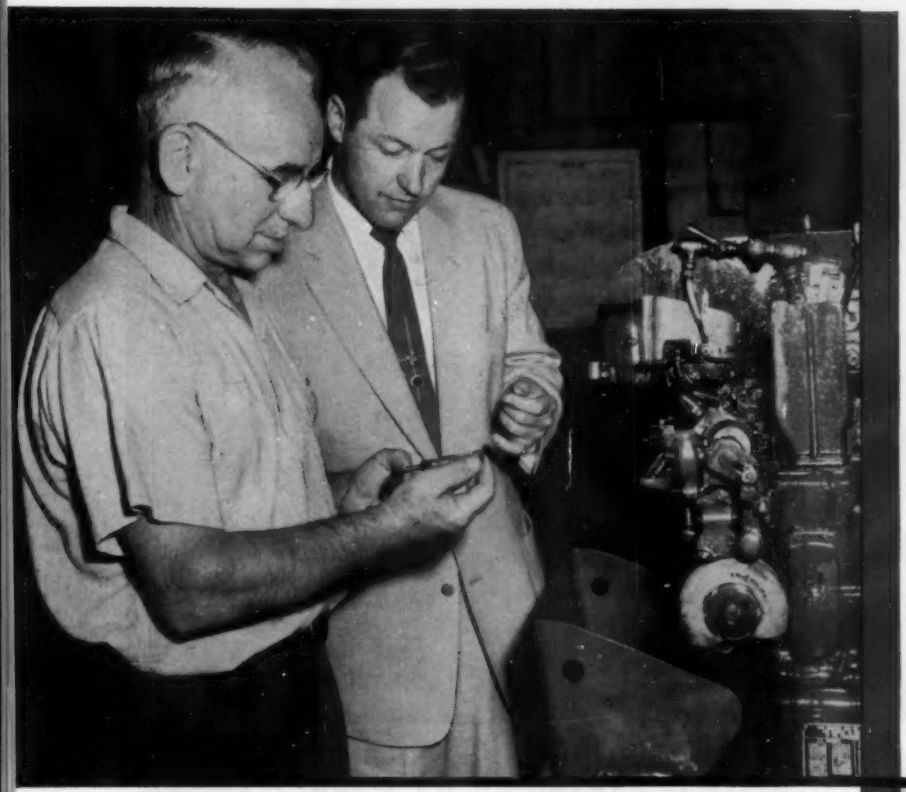
Gates Engineering Offices and Distributor Stocks are located in all industrial centers of the United States and Canada, and in 70 other countries throughout the world.

TPA-84A

GATES VULCO ROPE DRIVES

For more facts circle 508 on Reply Card

The story of 5 benefits Wayne Screw Products gets from using STANICUT CUTTING OIL



Plant Foreman Al Ziegman (left) and Standard industrial lubrication specialist L. J. Loomis examine pitch diameter of screw threads. L. J. Loomis' engineering background plus his field experience in industrial lubrication, customers find, pays off *for them.* Lee is a graduate of Tri-State college of Indiana with a B.S. degree. Before entering field work, he completed Standard Sales Engineering School.

STANICUT Oil 137 BCS solved finish problem for Wayne Screw Products Company, gave better finish on screw and machined parts like these—plus four other important benefits.

Management at Wayne Screw Products Company, Detroit, found they were not getting a completely satisfactory finish on aircraft quality stainless steel, which the plant was machining. They followed a suggestion made by their Standard Oil lubrication specialist to switch to STANICUT Oil 137 BCS. The result: five benefits.

1. Better finish
2. Higher quality work
3. Longer tool life
4. Higher production because of less down time for tool sharpening and adjusting
5. Cutting oil costs reduced approximately 50%

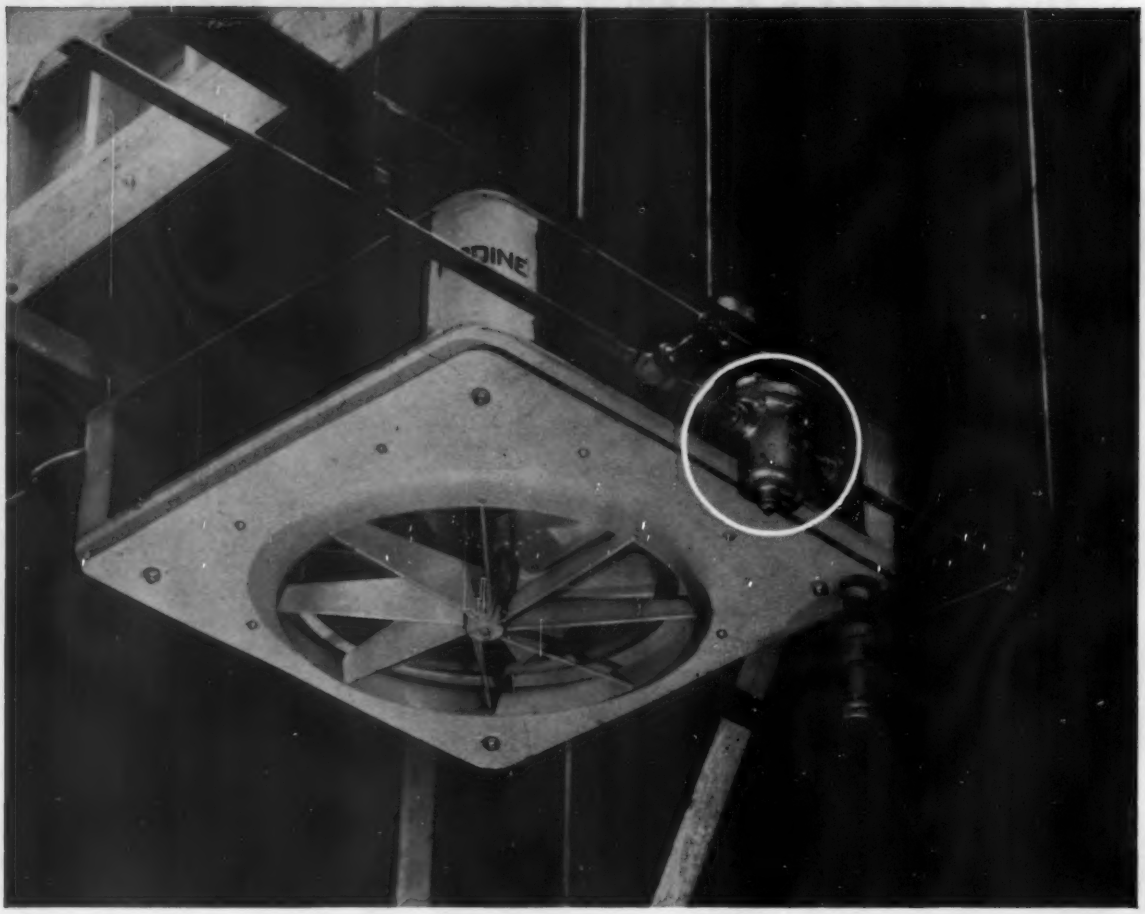
At first STANICUT Oil 137 BCS was used in two automatic screw machines—a National Acme Multi-Spindle and a Brown & Sharpe Single Spindle. Production benefits prompted Wayne Screw Products to convert other equipment to STANICUT Oil 137 BCS—and with similar results.

Delivering benefits like this is an old story for STANICUT Oil 137 BCS. A Standard Oil lubrication specialist will be happy to demonstrate how Standard's cutting oils can perform with similar results for you. In the Midwest, a call to your nearby Standard Oil office will bring a prompt response. Or contact Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

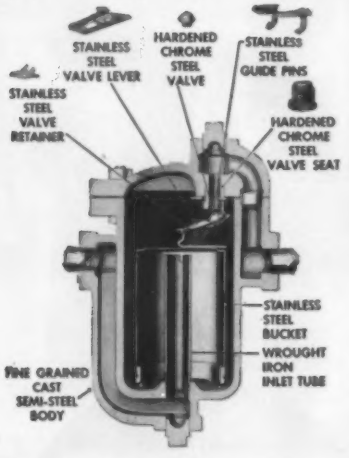
STANDARD

STANDARD OIL COMPANY
(Indiana)

For more facts circle 509 on Reply Card



How Corrosion of Unit Heaters is Prevented by Good Trapping


STAINLESS STEEL VALVE LEVER
HARDENED CHROME STEEL VALVE
STAINLESS STEEL GUIDE PINS
STAINLESS STEEL VALVE RETAINER
HARDENED CHROME STEEL VALVE SEAT
STAINLESS STEEL BUCKET
WROUGHT IRON INLET TUBE
FINE GRAINED CAST SEMI-STEEL BODY

Good Traps. The mechanisms in Armstrong traps for unit heaters are substantially identical in design, workmanship and materials to those used in traps for 900 lbs. pressure, 900 degrees F.

Cause. Costly corrosion of unit heaters is frequently the result of sluggish condensate drainage and inadequate venting. Any carbon dioxide gas present in the steam supply will go into solution if the condensate is below steam temperature, forming corrosive carbonic acid. Presence of oxygen aggravates the corrosion.

Remedy. Armstrong traps prevent carbonic acid formation because they discharge condensate *at steam temperature* and vent CO_2 and air at the same time. There is never any accumulation of condensate and incondensible gases to cause trouble as can occur with traps that must wait for condensate to cool before they will open.

Trap Selection. It is important that the traps be correctly sized, with a generous safety factor to provide adequate air handling capacity. Armstrong sizing recommedations are thoroughly reliable, being based on actual performance of the traps under operating conditions rather than on theoretical considerations.

Complete Details. Ask for Armstrong Bulletin No. 2312 which tells how to select and install traps for any type of unit heater. For your free copy, call your local Armstrong Factory Representative, or write:

ARMSTRONG MACHINE WORKS
912 Maple Street, Three Rivers, Michigan

ARMSTRONG STEAM TRAPS *Application Engineered*

For more facts circle 510 on Reply Card

Norgren...the most complete line of AIR LINE LUBRICATORS

FOR BETTER PERFORMANCE • LONGER LIFE • LESS MAINTENANCE COSTS

79 MODELS...3 OZ. TO 5 GAL. OIL CAPACITIES...⅛" TO 1½" PIPE SIZES

MICRO-FOG LUBRICATORS *for Tools, Cylinders and Other Air Equipment*

½ PT. OIL CAPACITY

Constant Oil Level

5 pipe sizes, ¼" to 1" incl.
Replaceable, transparent oil reservoir. Series 30-41-LC.

Without Constant Oil Level

5 pipe sizes, ¼" to 1" incl.
Replaceable, transparent oil reservoir. Series 30-41-L.

⅓ PT. OIL CAPACITY

¼" and ⅜" pipe sizes.
Replaceable, transparent oil reservoir. Series 30-40-L.

1 QT. OIL CAPACITY

5 pipe sizes, ¼" to 1" incl.
Replaceable metal reservoir.
Constant Oil Level.
Series S3406-LC.

1¾ GAL. OIL CAPACITY

5 pipe sizes, ¼" to 1" incl.
Replaceable, metal oil reservoir.
Constant Oil Level.
Series X3400-LC.

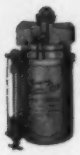
4½ GAL. OIL CAPACITY

5 pipe sizes, ¼" to 1" incl.
Replaceable, metal oil reservoir.
Constant Oil Level.
Series Y3400-LC.

MICRO-FOG BEARING LUBRICATORS *of 32, 200, 300, 1000 bearing inch capacities*

⅓ PT. OIL CAPACITY

Model 30-40-2S—¼" pipe size.
32 bearing inch capacity.



1 QT. OIL CAPACITY

Model S3406-2S—¼" pipe size.
32 bearing inch capacity.
Model S3406-6S—¾" pipe size.
200 bearing inch capacity.
Model S3406-8S—1" pipe size.
300 bearing inch capacity.

½ PT. OIL CAPACITY

Model 30-41-2S—¼" pipe size.
32 bearing inch capacity.

1¾ GAL. OIL CAPACITY

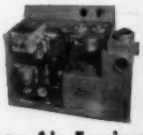
Model X3400-2S—¼" pipe size.
32 bearing inch capacity.
Model X3400-6S—¾" pipe size.
200 bearing inch capacity.
Model X3400-8S—1" pipe size.
300 bearing inch capacity.

4½ GAL. OIL CAPACITY

Model Y3400-2S—¼" pipe size.
32 bearing inch capacity.

Model Y3400-6S—¾" pipe size.
200 bearing inch capacity.

Model Y3400-8S—1" pipe size.
300 bearing inch capacity.



Model 33AB-4
½" Inlet, 2" Outlets.
1000 bearing inch capacity.

OIL-FOG LUBRICATORS *for Tools, Cylinders and other Air Equipment*

3 OZ. OIL CAPACITY

¼" pipe size.
Permanent, metal oil reservoir.
Model 399LB-2.

⅓ PT. OIL CAPACITY

¼" and ⅜" pipe sizes.
Replaceable, transparent oil reservoir.
Reversible. Series O-40.

¼" pipe size.
Permanent, metal oil reservoir.
Model 399-2.

½ PT. OIL CAPACITY

5 pipe sizes, ¼" to 1" inclusive.
Replaceable, transparent oil reservoir.
Reversible.
Series O-41 and O-42.

5 pipe sizes, ¼" to 1" inclusive.
Replaceable, metal oil reservoir.
Reversible.
Series SO-41 and SO-42.

1 QT. OIL CAPACITY

5 pipe sizes, ¼" to 1" inclusive.
Replaceable, metal oil reservoir.
Reversible.
Series S406.

1¼" and 1½" pipe sizes.
Permanent, metal oil reservoir.
Series 406.

2 QT. OIL CAPACITY

5 pipe sizes, ½" to 1½" inclusive.
Permanent, metal oil reservoir.
Series 408.

2 GAL. OIL CAPACITY

5 pipe sizes, ¼" to 1" inclusive.
Replaceable, metal oil reservoir.
Reversible.
Series X400 and X402.

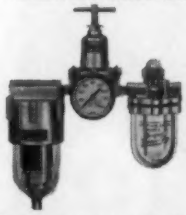
1¼" and 1½" pipe sizes.
Replaceable, metal oil reservoir.
Series X406.

5 GAL. OIL CAPACITY

5 pipe sizes, ¼" to 1" inclusive.
Replaceable, metal oil reservoir.
Reversible.
Series Y400 and Y402.

1¼" and 1½" pipe sizes.
Replaceable, metal oil reservoir.
Series Y408.

LUBRO-CONTROL UNIT



showing typical combination of Micro-Fog Lubricator with Automatic-Drain Filter and Air-Pressure Regulator.

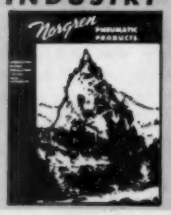
OVER 1,100,000 NORGREN LUBRICATORS PUT TO USE IN INDUSTRY

C. A. Norgren CO.
3443 So. Elati, Englewood, Colo.

Phone the Norgren representative listed in telephone directory classified section under "Norgren Pneumatic Products"... or

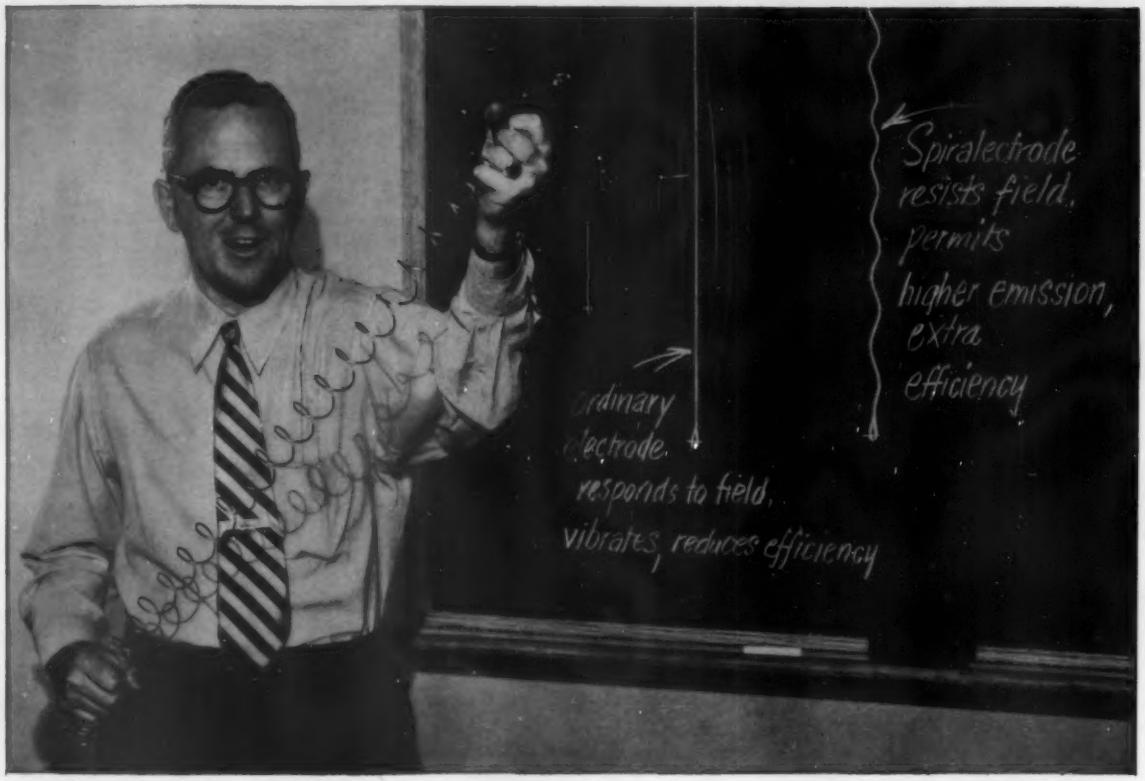
WRITE FOR CATALOG →

showing latest developments in Micro-Fog lubrication and giving data on Norgren's *complete line* of lubricators, air filters, pressure regulators, valves, hose assemblies.

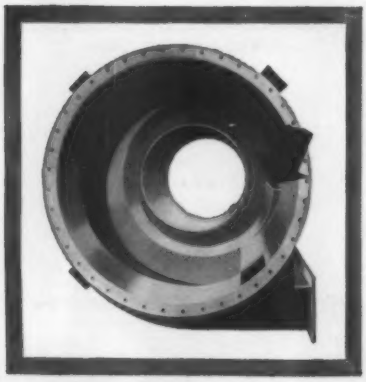


For more facts circle 511 on Reply Card

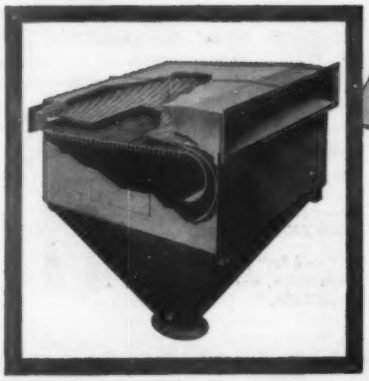
How Buell's Unique Spiralectrodes deliver EXTRA DUST COLLECTION EFFICIENCY!


Spiralectrode resists field, permits higher emission, extra efficiency
Ordinary electrode responds to field, vibrates, reduces efficiency

Coupled with the unique spiralectrode feature is Buell's Continuous Cycle Rapping—the most effective mechanism yet developed for dry dust precipitation. Completely eliminates puffing, keeps electrodes constantly clean. Re-entrained dust is minimized, peak efficiency is maintained.



Buell Cyclones also deliver extra efficiency, due to exclusive shave-off which harnesses double-eddy and puts it to work!



Buell's Low Resistance Fly Ash Collector combines top efficiency with low draft loss, for natural or forced draft installations.

For the complete story behind Buell's *extra efficiency*, write Dept. H-14, Buell Engineering Company, 70 Pine Street, New York 5, N. Y.

buell®

MECHANICAL ELECTRICAL *Experts at delivering Extra Efficiency in* **DUST COLLECTION SYSTEMS**

For more facts circle 512 on Reply Card

They voted LYON 5 TO 1

Key executives of companies throughout the country have voted 5 to 1 for Lyon! They have given Lyon more first choice mentions than the next thirteen manufacturers combined!

A nationally known research company compiled those figures when they asked key men in 5,000 companies this question:

"If your company were in the market for steel equipment such as steel shelving, lockers, work benches, shop boxes, etc., what manufacturers would you consider?"

Your nearest Lyon Dealer offers the world's *most diversified* and *most preferred* line of quality steel equipment. (A few are shown below.) Equally important, he can show you how to get the most out of steel equipment in terms of time, space and money.

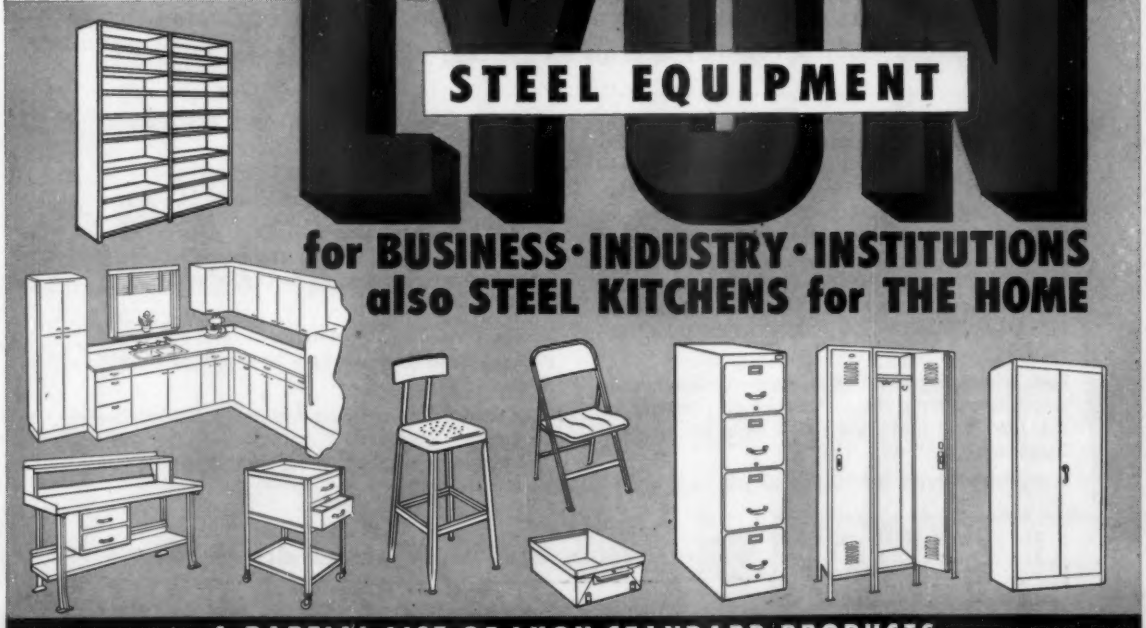
LYON METAL PRODUCTS, INC.
General Offices: 891 Monroe Ave., Aurora, Ill.
Factories in Aurora, Ill. and York, Pa.
Dealers and Branches in All Principal Cities

Lyon also has complete facilities for manufacturing special items to your specifications.

LYON®

STEEL EQUIPMENT

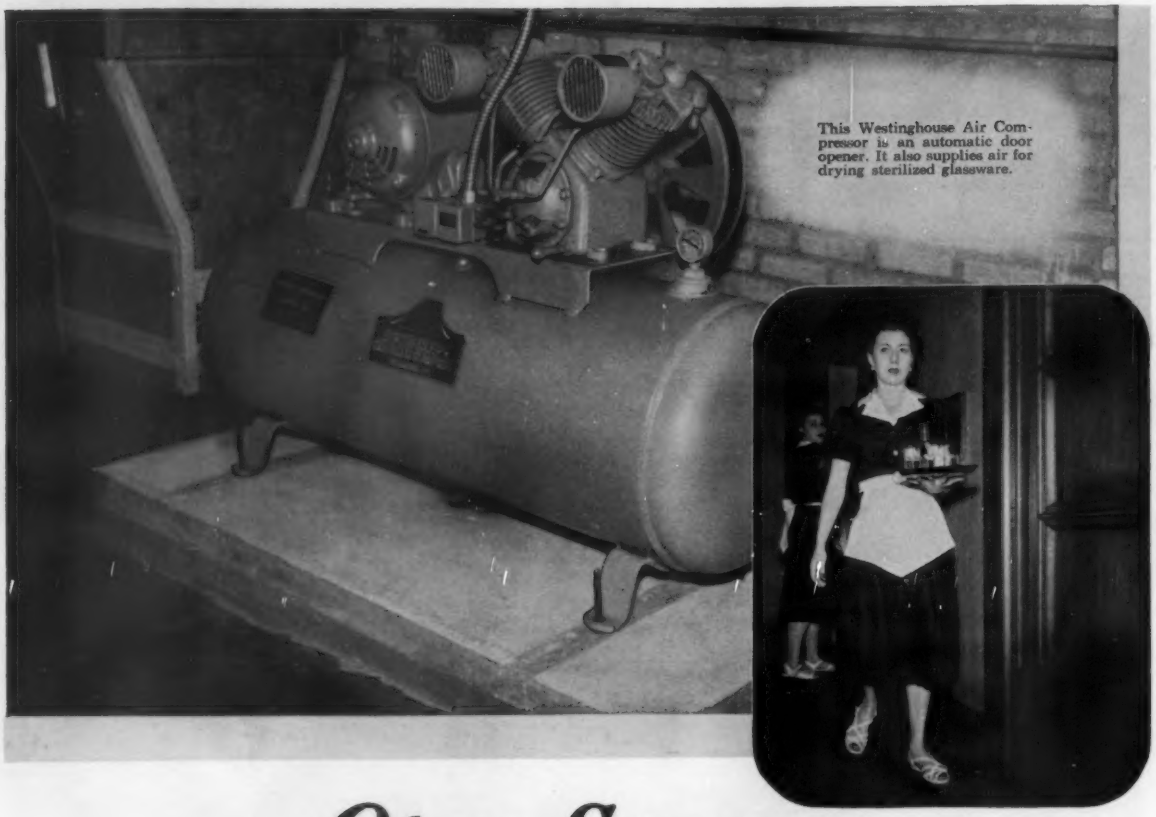
for BUSINESS • INDUSTRY • INSTITUTIONS also STEEL KITCHENS for THE HOME



A PARTIAL LIST OF LYON STANDARD PRODUCTS

• Shelving	• Kitchen Cabinets	• Tool Toters	• New Freedom Kitchens	• Flat-Drawer Files	• Folding Chairs	• Service Carts	• Tool Stands
• Lockers	• Cabinet Benches	• Bar Racks	• Display Equipment	• Revolving Bins	• Coat Racks	• Sorting Files	• Shop Boxes
• Stools	• Storage Cabinets	• Tool Boxes	• Toolroom Equipment	• Filing Cabinets	• Work Benches	• Drawer Units	• Tool Trays
• Bin Units	• Drawing Tables	• Parts Cases	• Wood Working Benches	• Hanging Cabinets	• Bench Drawers	• Hopper Bins	• Shop Desks

For more facts circle 513 on Reply Card



This Westinghouse Air Compressor is an automatic door opener. It also supplies air for drying sterilized glassware.

Open Sesame

...the magic flexibility of air power supplied by Westinghouse Air Compressors, opens the door to greater efficiency, lower costs

The usefulness of compressed air is little short of amazing. It opens doors, inflates tires, paints equipment, runs punch presses, operates hoists and myriads of pneumatic tools that multiply a worker's productivity.

There are many more uses, but they all add up to lower costs. That's why the source of your air power is so important. It must be dependable to produce maximum savings — it should be a Westinghouse Compressor. Here are a few reasons why:

Low oil-level protection — your Westinghouse won't pump air if the oil-level or oil pressure is too low. You never get repair bills for lack of lubrication.

Automotive-type lubrication — constant pressure principle forces oil to every moving part for longer life.

Single- and two-stage, air-cooled design — provide air at maximum efficiency. Cost less to operate.

Starting unloader — keeps compressor unloaded until motor reaches normal speed and oil circulation starts.

Thermal overload protection — cuts current if motor should overheat or if line voltage should drop.

Open the door to lower costs with dependable air power. Insist on Westinghouse Air Compressors in your plant. Sizes up to 40 hp. Write for latest literature.

W-104

LE ROI *Division of Westinghouse Air Brake Co.*

Milwaukee 14, Wisconsin

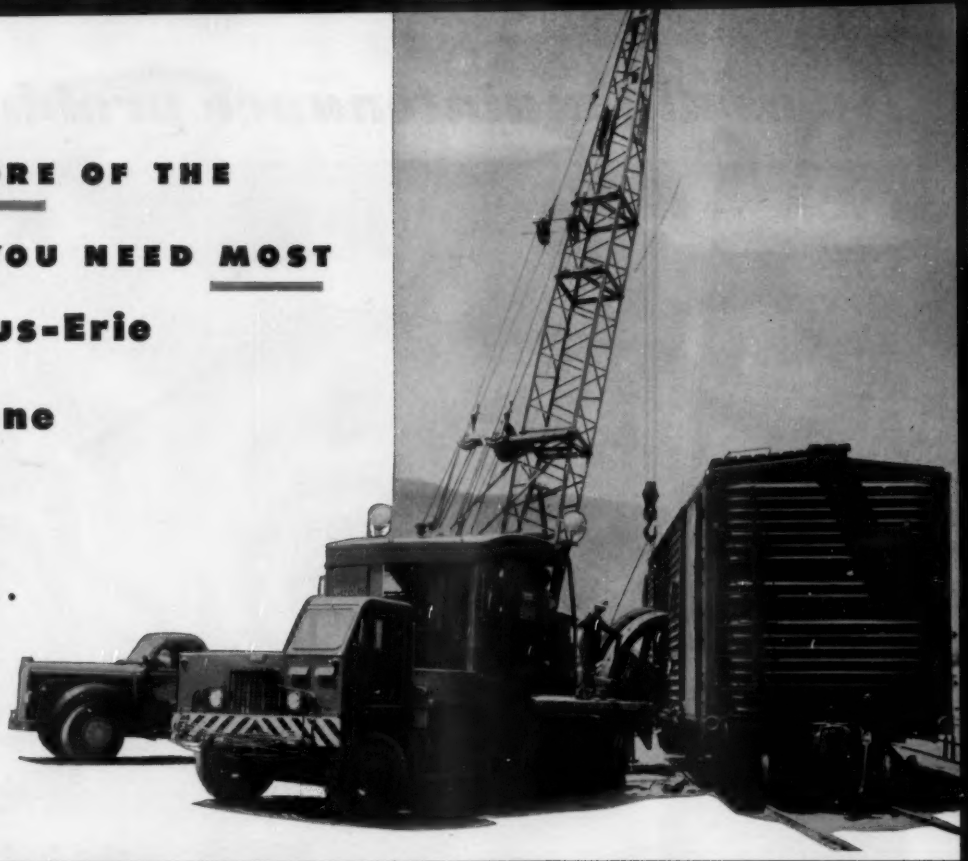
PORTABLE AIR COMPRESSORS · TRACTAIR · STATIONARY AIR COMPRESSORS · AIR TOOLS · ENGINES

Distributors in all principal cities

For more facts circle 514 on Reply Card

For more facts circle 515 on Reply Card ⟶

YOU GET MORE OF THE FEATURES YOU NEED MOST in a Bucyrus-Erie Transit Crane



HERE'S PROOF....

Your Bucyrus-Erie distributor can give you plenty more!

FEATURE	MODEL 15-B	MODEL 22-B	HOW YOU BENEFIT
Friction swing brake.	Standard	Standard	Operator can spot and hold boom point over desired position.
Power controlled lowering for main hoist line on lifting crane.	Standard	Standard	Provides high accuracy in lifting or lowering loads.
Independent power boom hoist with power controlled lowering.	Standard	Standard	Boom angle can be changed while machine is swinging or propelling, while load is being hoisted or lowered.
Open-throat boom design.	Standard	Standard	Permits rigging 2, 3, or 4 parts of line without removing sheave guards.
8-part pendant suspension.	Standard	Standard	Ideal for changing boom lengths conveniently and with minimum downtime.
Safety boom stops on all machines equipped for lifting crane service.	Standard	Standard	Added safety. Prevents boom from accidentally snapping over center and striking cab.
Boom angle indicator.	Standard	Standard	Enables operator to determine angle of boom at all times.
Full 3-side vision from operator's cab.	Standard	Standard	Gives him clear view of his entire operating range and of all men or obstructions in the vicinity.
16-part boom suspension.	Optional at extra cost	Optional at extra cost	Provides slower boom hoisting or lowering for even greater precision control.
Boom folding mechanism.	Optional at extra cost	Optional at extra cost	Booms over 60 feet long can be carried folded on job-to-job moves.

BUCYRUS ERIE

BUCYRUS-ERIE COMPANY
SOUTH MILWAUKEE, WISCONSIN

126E55C

No costly maintenance problem here

Used as siding for this recently completed building, Johns-Manville Corrugated Transite will provide years of durable service and fire safety with a minimum of care. It needs no paint or special treatment to preserve it.

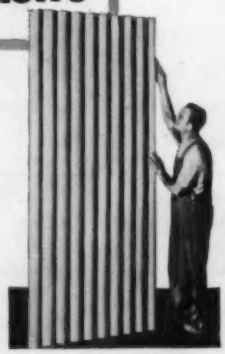
build with Johns-Manville Corrugated Asbestos Transite

For maintenance-free exterior walls and roofs, plus protection from fire, rot and weather

YOU SAVE MONEY on construction and maintenance when you build with Johns-Manville Corrugated Transite®. Corrugated Transite comes in large sheets that require a minimum of framing . . . permits fast economical construction of maintenance-free industrial, commercial, institutional and agricultural buildings.

Made of asbestos and cement, Corrugated Transite is practically indestructible. It never needs paint or special treatment to preserve it . . . it's fireproof, rotproof and weatherproof. Corrugated Transite is also used increasingly for smart interiors . . . the streamlined corrugations and attractive shadow lines that give it such unusual architectural appeal for exteriors offer unlimited interior design possibilities.

Investigate Johns-Manville Corrugated Asbestos Transite and learn how you can build quickly and easily . . . have an attractive, long-lasting, trouble-free structure regardless of size or purpose. For complete details write Johns-Manville, Box 158, Dept. PE, New York 16, New York. In Canada write 565 Lakeshore Road East, Port Credit, Ontario.



- Large sheets go up quickly
- Easy to fasten to steel
- Easy to nail to wood
- Easy to saw
- Easy to drill

See "MEET THE PRESS" Sundays on TV, sponsored by Johns-Manville. Consult your newspaper for time and station.

JOHNS-MANVILLE JM PRODUCTS

Johns-Manville

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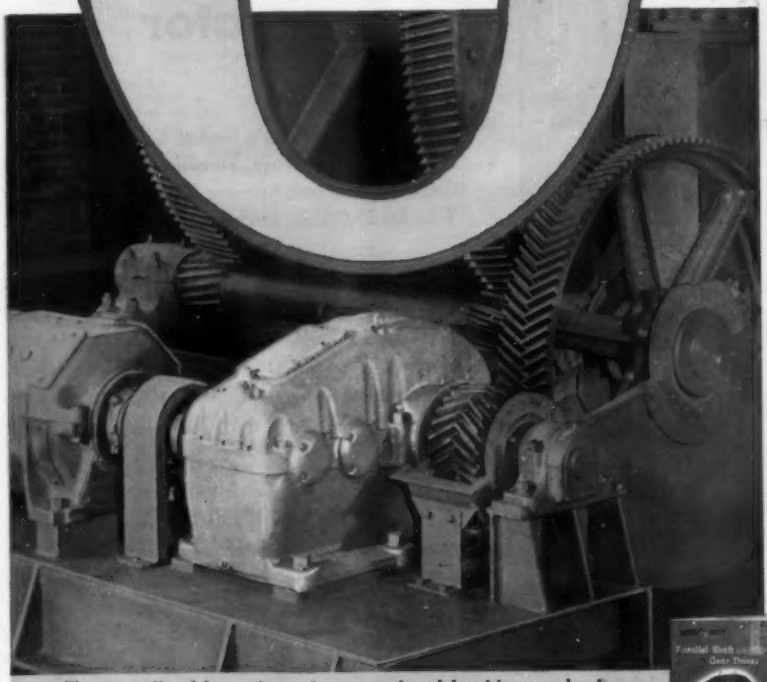
6 reasons why

Link-Belt Parallel Shaft Gear Drives

ASSURE CONTINUOUS PRODUCTION



Ten-ton coils of hot strip steel are transferred by this up-ender in a modern mill. Link-Belt parallel shaft gear drive fitted with outboard bearing on output shaft withstands the exceptionally tough duty.

LINK-BELT'S compact, self-contained parallel shaft gear drives are designed to avoid common problems encountered in transmitting heavy shock loads. Here's how:

1. FOR DEPENDABLE OPERATION gears are precision-machined, shafts rigidly supported.
2. TO WITHSTAND HEAVY SHOCK and overhung loads, ball and roller bearings are used throughout.
3. TO PREVENT ENTRANCE OF DIRT and moisture, effective grease-lubricated seals are used on all shafts.
4. FOR SUPPLYING OIL to each rotating part at all speeds, automatic splash lubrication is used.
5. TO PREVENT REVERSE ROTATION on conveyors, elevators and similar equipment, a built-in backstop can be provided.
6. FOR EASY INSPECTION OR MAINTENANCE, all parts can be removed without disturbing base, which can be grouted in concrete.

Book 2619 gives complete details. Get a copy from your Link-Belt office or authorized stock carrying distributor. Or write direct.

Get JOB-MATED drive combinations from the complete Link-Belt line

In addition to parallel shaft gear drives, Link-Belt builds in-line helical and worm gear drives, Gearmotors, Motogears, variable speed drives, fluid drives, chains, sprockets, couplings, bearings, etc. All are pre-engineered for easy installation and maximum efficiency.

LINK-BELT

ENCLOSED DRIVES

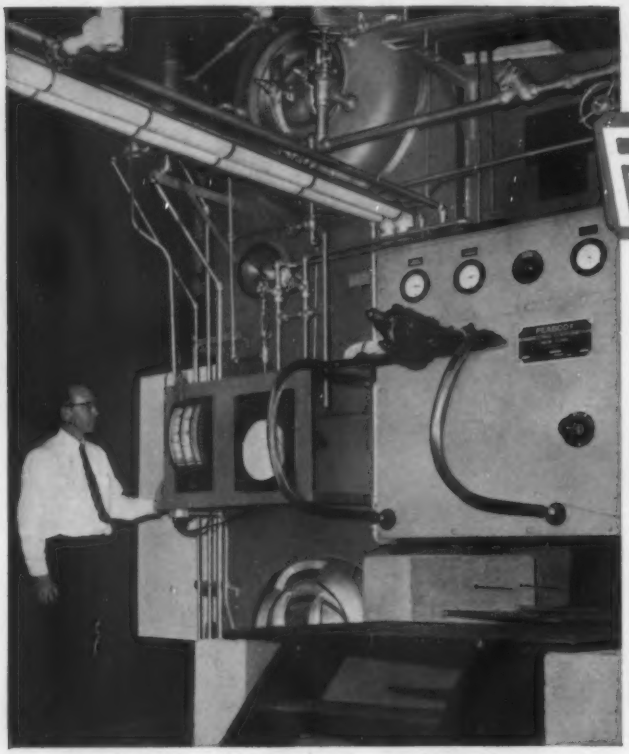
LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 18,874

For more facts circle 517 on Reply Card

HOTEL SYRACUSE

SYRACUSE, NEW YORK

CUTS STEAM COSTS by $13,680 per year



Chief Engineer John Reschke of Hotel Syracuse makes routine inspection of new FW Packaged Steam Generator. This single unit, in continuous year-around service, supplies all steam requirements for the Hotel's 600 rooms, 4 restaurants, 3 kitchens, 13 stores, lobby, grand ballroom and laundry PLUS the heating and processing requirements of an adjacent hotel!

with this new

packaged steam generator

Central New York's largest hostelry, the 600-room Hotel Syracuse, recently replaced two of their original coal-burning boilers with a Foster Wheeler 25,000 lb/hr Packaged Steam Generator.

According to Chief Engineer John Reschke, the advantages of the new unit were immediately apparent. Steam cost dropped from 90 cents to 71 cents per 1,000 lb. Based on average consumption of about 72,000,000 lb per year, this represents an annual saving of $13,680 in steam costs alone. Other advantages are rapid steaming, lower maintenance and a cooler boiler room.

• • •

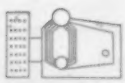
For low-cost steam "where you need it—when you need it," you get a better buy with the Foster Wheeler Package Steam Generator. For more detailed information, write for *new* catalog, PG-55-3. *Foster Wheeler Corporation, 165 Broadway, New York 6, N. Y.*

LOOK INTO THESE FW FEATURES:

RAPID LOAD SWINGS. Large diameter drums and ample heating surface.

HIGH STEAM TEMPERATURES. Provisions for high superheat.

ADAPTABILITY. Easily moved. Require only a slab foundation—permit outdoor installation.



ECONOMIZERS. Package economizers available to increase capacity and minimize fuel cost.

ACCESSIBILITY. For inspection, cleaning and maintenance.

COOLER OPERATION. Maximum water-cooled surface, special insulation mean cooler boiler room.

FOSTER WHEELER

For more facts circle 518 on Reply Card

BULLETINS just released and of immediate plant interest

INSTRUMENTS, CONTROLS

101 Successful Automation—Twenty-pp Bulletin PA 555 contains specifications, descriptive data and operational charts on controls for numerous industrial uses including high-speed counting, inspection and sorting, smoke control, high-temperature measurement and control, machinery safeguards and conveyor control. Accessories for increasing the scope of the controls are also shown. Photoswitch Div., Electronics Corp. of America.

102 Propeller Type Meters—Twelve-pp Bulletin 380-K4A covers company's Propelofio meters, a direct-reading, propeller type instrument for metering water and other liquids. Divided into major sections on typical specifications, types, typical accuracy curves, ranges, installation dimensions, and pressure loss chart, it also contains subheadings on the electrically and electro-mechanically-operated totalizer, indicator, and recorder. Builders-Providence, Inc.

103 Electronic Flow Meters — Publication 55-1074-222, 12-pp, describes company's line of electronic flow meters for measurement of differential pressures, liquid level, fluid, gas, air or steam flow, temperatures and pressures. Points out advantages, describes mercury-less transmitters, transmission system, receiver, integrator, other features. The Hays Corp.

104 High Pressure Meters — Bulletin OG 407, 8-pp, describes company's complete line of ER industrial meters for high vapor pressure liquids, such as liquid propane, liquid anhydrous ammonia, and liquid oxygen. Lists specific models for each type of liquid and explains Parkhill Wade Dispensing System and its advantages. Meter and Valve Div., Rockwell Mfg. Co.

105 Temperature Monitoring — The Omniguard Temperature Monitoring System as an economical way to monitor remote temperatures is explained and illustrated in 6-pp Publication 3036A. Discusses features of the system, tells how it operates, and provides specifications. Detecting elements and accessories are covered. Instrument Div., Thomas A. Edison, Inc.

106 Filter Plant Gages—Bulletin 1002, 22-pp, features filter plant gages for the measurement of effluent flow, loss of head, wash water, water elevation and per cent of filter bed expansion. Describes various types of meters and includes facts on operation, construction, general information, sizes and capacities, specifications and other pertinent data. Text is supplemented with photos, cut-away views, and diagrams. Simplex Valve & Meter Co.

107 Current Controllers — Bulletin EB-1 describes company's Model EB current controller—a pneumatic-electric transducer which provides automatic control of current input required in many types of industrial operations and processes. In addition to showing operating features, bulletin illustrates typical applications. Conoflow Corp.

108 Automatic Interlock—Folder 260, 12-pp, describes technical aspects of the Shur-flow automatic interlock. Contains flow charts, wiring diagrams, and application information. The interlock is a device to protect equipment, when flow is below the desired minimum, or above a desired maximum. Industrial Sales Div., Hays Mfg. Co.

109 Audio-Video Instruments—Portable instruments which serve as electronic eyes and ears for both maintenance and production jobs are shown in this folder. The Elec-Detec for audio operation and the Elec-Detec Model V for video and audio are described. Eleven uses of these instruments are cited. Anco Instrument Div., American Name Plate & Mfg. Co.

110 Truck Scales — Eight-pp Form 2417a describes company's expanded line of truck scales ranging from 60 ft, platform sizes down to axle load scales. Points out features offered in the weighbridge construction and pit design which is claimed to achieve higher strength, installation economies. Toledo Scale Co.

Reader Service Cards for ordering bulletins are on pages 161-162. Be sure to include your name, job title, and company.

PUMPS, COMPRESSORS

111 Controlled Volume Pumps — Bulletin H20-1 describes company's controlled volume pump model H-20 designed for accurate chemical feed at low cost. Complete information includes data on simplex and duplex models, capacities, pressures, materials of construction and mounting dimensions. Milton Roy Co.

112 For Hazardous Liquids—Catalog Section D, 12 pp, presents company's line of Underwriter rotary pumps for hazardous liquids. Both mechanical seal and deep stuffing box models are shown and dimensions and specifications provided. Various mounting arrangements and drives available for these UL approved pumps are also cataloged, and application suggestions are given. Also in this booklet are performance graphs, selection table. Viking Pump Co.

113 Oil, Gas Compressors—Illustrated Bulletins 604 and 605 give brief application and construction information on two types of single-stage, double-acting horizontal straight-line compressors designed to compress air or gas free of oil or oily vapors. Large sectionalized views are provided. Pennsylvania Pump & Compressor Co.

114 Balanced Opposed Compressors—Engineering data on balanced opposed compressors, 3000 to 10,000 hp (top range in tandem arrangement) is contained in 36-pp Bulletin L-679-B1. Presents information on operation, drives, design features, running gear, lubrication, valve action, capacity control, coolers and accessories. A chart listing approximate dimensions is included, along with photos of compressor installations. Worthington Corp.

PACKINGS, SEALS

115 Teflon Products—Three new bulletins present this company's Teflon packings, gaskets, special parts and stock. Bulletin CP552 describes Chempro lines of Teflon ring packing, Teflon impregnated asbestos packing, V-type packing, and Teflon seal cage—for use with acids and strong chemicals. Bulletin CP553 covers Teflon jacketed gaskets, solid ring gaskets, expansion joints and special gaskets. Bulletin CP554 illustrates special parts. Chemical & Power Products, Inc.

116 Hydraulic Seal — Quad rings — their composition, specifications, applications and advantages—are discussed in this 10-pp illustrated folder. Describes factory approved methods for installing these hydraulic seals. Typical applications, with all uses shown in photos and cutaway drawings, are presented. Packing gland design, with illustrations and instructions for finding correct groove dimensions, is also covered. Minnesota Rubber and Gasket Co.

117 Improved Oil Seals — This illustrated 28-pp manual details the selection, application and installation of clipper seals. Descriptions cover the latest seal designs, including the new LPD and RPD, the extruded and moulded oil slingers and end face seals. Important points are illustrated by close-up photos and detailed drawings. Essential data is in tabular form, and documental histories cited. Johns-Manville.

PIPING, VALVES, FITTINGS

119 For Piping Economy—Factors involved in piping economy are explained briefly in this 8-pp booklet. Reviews the three important costs —the pipe itself, installation, and maintenance —and shows how higher initial cost of wrought iron pipe is more than offset by long service and reduced maintenance. A. M. Byers Co.

120 Rugged Valves — Eight-pp Bulletin GV-11 presents data on several types of valves designed primarily for the petroleum industry and described as simple, rugged and dependable. A gate valve line blind, self-closing sampling valve, vertical-swing horizontal check valve, and quick-closing valve are shown and described as to design, operation and uses. Greenwood Valve Div., Vernon Tool Co., Ltd.

121 Steel Globe Valves — Bulletin 55-A shows major stainless steel globe valves in company's line. In addition to schematic drawings of the various valves, booklet includes a section on design factors, as well as a table of major stainless alloys, giving their designations and applications. Cooper Alloy Corp.

122 Butterfly Valves — Bulletin 650-L1A covers company's tight-closing rubber-seated butterfly valves, Model BV. In addition to photos and drawings of valves, there are major sections on valve operators, a description of valve components, sizes, pressures, and velocities. Builders-Providence, Inc.

123 High Pressure Reducing Valve — Information on company's Standard Type 345 high pressure reducing and regulating valve is contained in Bulletin S-731. Included are photos and a cross-sectional drawing, recommended uses, description of construction and operation features, capacity, rating and sizing charts and other data on the valve. A. W. Cash Co.

124 Refrigeration and Air Conditioning Valves—Catalog R-5, 24-pp, gives size and application data for a complete line of brass valves, accessories, and fittings for refrigeration and air conditioning applications. Incorporates recent technical data on relief valves, check valves and low micron testing of standard line and globe valves. Superior Valve & Fittings Co.

125 Packless Expansion Joints — Flexible pipe connections used to solve vibration and expansion control problems in piping are described in 12-pp Catalog EZ-55. Discusses applications in absorption of vibration, expansion and contraction in steam, chemical, oil and gas lines. Gives pressure and temperature ranges of application, lists dimensions and specifications, as well as illustrating various types of special-purpose joints available. T. R. Finn & Co., Inc.

BOILERS, GENERATORS

126 Package Boilers—This 12-pp booklet on package steam generators, describes the formulas behind all package steam generators, and illustrates how installation of a package steam generator can raise steam capacity in an existing boiler room without extensive structural changes. Shows plant operators how to make survey of their own steam requirements. Cyclotherm Div., National-U. S. Radiator Corp.

127 Steam Operating Units—Design data on outdoor and indoor installations of modern high pressure, high capacity steam generating units is contained in this illustrated 12-pp catalog. It is complete with charts and tables on company's line of boilers and includes information on superheaters, economizers, air heaters, steam temperature controls, and steam purifiers. Springfield Boiler Co.

ELECTRICAL

128 Network Protectors — Bulletin GEA-2017E, 28-pp, covers all phases of a-c secondary networks. Illustrations include numerous diagrams, charts, and photos of the units and their components, with detailed descriptions of their operation. Also included are discussions of fuses and relays in network protectors, as well as full specifications. General Electric Co.

129 Low Voltage Breakers—Six-pp Bulletin 18B8252 outlines advantages of low voltage air circuit breakers for motor loads, lighting loads, heaters, welders, and transformers. Features which provide for greater accuracy, safety and flexibility are illustrated. Thermal curves showing average time current curve for various adjustments and typical selective trip curves showing ability of circuit breakers to be coordinated with other protective equipment are included. Allis-Chalmers Mfg. Co.

BULLETINS

(Begins on page 21)

130 High-Voltage Control—This company's Limitamp high-voltage motor control is the subject of Bulletin GEA-6331, 12 pp. Outlines in detail the features of the high-voltage, current-limiting, fused starters for co-ordinated control of squirrel-cage, synchronous, wound-rotor, and multi-speed motors. Simplified installation and reduced space requirements are covered. General Electric Co.

131 Low Voltage Switchgear — Metal-enclosed low-voltage switchgear in indoor and outdoor arrangements is described in Bulletin 18B8283. Outstanding features are listed, and special advantages of the outdoor type are pointed out. Dimensions and ratings of this switchgear for service to 600 v are included. Allis-Chalmers Mfg. Co.

132 Current-Limiting Fuses—Bulletin GEA-6319, 8-pp, features current-limiting fuses rated 250 and 600-v in sizes from 6 to 200-amp, designed for low-voltage circuit applications such as fused safety switches, fused combination starters, small motor circuits, where conventional fuses do not have adequate interrupting capacity. Includes specifications, current-limiting characteristics. General Electric Co.

133 Vertical Motor — Twelve-pp Bulletin GEA-6280 introduces manufacturer's vertical Tri-Clad motor. Emphasizes reduced maintenance costs and simplified lubrication of the new motor which is of shielded hollow-shaft, high-thrust type ranging from 7½ to 500 hp. General Electric Co.

LIGHTING, COMMUNICATION

135 Vapor-Tight Lighting—This 16-pp bulletin describes company's vapor-tight incandescent lighting equipment. Construction and design features are outlined for heavy duty vapor-tight pendant units, ceiling units, outlet box hood units, vapolets, vapolet hand portable, angle type vapolets, water tight units, reflectors and accessories. Full specifications on all items are included. Benjamin Electric Mfg. Co.

136 Tone Signaling Units—Operating features and performance of company's supervisory tone equipment of modular design are presented in this 6-pp bulletin. Tells how these units transmit and receive signaling, dialing, telemetering, supervisory controls and other information, over wire lines, telephone or power line carrier, and radio microwave communication circuit. Hammarlund Mfg. Co., Inc.

137 Microwave Units—Microwave building block units which can be assembled in various combinations to provide numerous communications functions are described in five catalog pages (C.5461 to C.5465). They include a transmitter, receiver-modulator, terminal AFC, Msband unit, and power supply. Each unit is described in detail and specifications provided. Radio Corp. of America.

MECHANICAL POWER TRANSMISSION

138 Improved Speed Reducers — Forty-pp Engineering Manual LP 3 covers design features and application of Line-O-Power straight-line and right-angle speed reducers. Flexibility of this line of drives is stressed. Detailed selection data is provided including service factors and load characteristics to be considered. Ratings and dimensions are given. Also described and pictured are units supplied with base plate ready for motor, drives with built-in backstop and drive combined with motor. Several installations are pictured. Foote Bros. Gear and Machine Corp.

139 Fluid Drives—Bulletins 9419 and 9519 are an illustrated catalog and selection guide on company's new Type VS Class 2 Gyrol fluid drives. Catalog discusses advantages and applications of the drives, covering speed control, power savings, simplified installation, etc. A sectional view shows construction and principle of operation. Dimensions for six sizes of drives are provided, also dimensions for speed control mechanisms. The selection guide consists of tables indicating drive to use with 7.5 to 800 hp motors. American Blower Corp.

140 Adjustable Speed Drive—Eight-pp Bulletin GEA-6234 presents the general purpose, full-wave Thy-mo-trol adjustable speed drive, of ¼ to 3 hp, covering in detail its simplicity of operation and economy. Features several industrial applications and emphasizes the unit's printed control circuits. General Electric Co.

141 Speed Changer—Operating advantages of Vari-Pitch speed changers are described in 6-pp Bulletin 20B6013D. Bulletin includes arrangement diagrams, a selection table showing recommended unit size for standard motors, and speed range table. Allis-Chalmers Mfg. Co.

142 Adjustable, Preset Drives—These two bulletins cover ACA adjustable-speed drives, and a-c preset-speed press drives. Bulletin GEA-5568A, 8-pp, features application references for company's ACA adjustable-speed drives, and includes statistics concerning installation and operating factors. Bulletin GEA-5702, 8-pp, emphasizes versatility of the new AC preset-speed drives and includes a selector chart. General Electric Co.

143 Variable Speed Pulley—Instructions for selecting and installing variable speed pulley systems for industrial power take-off are presented in Bulletin A954-2, 8 pp, on company's Hi-Lo automatic variable speed pulleys. Using formulas and tables, bulletin lists seven steps in the process of securing correct pulley system for the application. Equipment Engineering Co.

144 Magnetic Transmission Equipment — Eight-pp Bulletin 226-D covers company's standard magnetic brakes and clutches, offering complete selection data. It also includes specifications on the companion new line of magnetic brakes for re-rated NEMA frame sizes. Stearns Magnetic Inc.

145 Transmission Equipment—Two folders now available include 8-pp Bulletin I.C.-2.3 on a power drive cylinder which operates on 500 psi maximum oil or 200 psi maximum air. The cylinder's design, lubrication, optional cushioning features are described and schematic drawings show eight types of mountings. Bulletin I.C.-2.2 gives details on pneumatic-hydraulic actuators and controls for industrial production machinery. Industrial Actuators and Controls Div., National Pneumatic Co., Inc.

HEATING, COOLING

146 On Gradiation Heating — Sixteen-pp Bulletin S-1043 reviews gradiation heating for petroleum and chemical processing. Covers advantages of this company's heater design, major applications, operating principles, construction and design features. Also discusses gradiation principles as applied to low capacity heaters. Some heaters for specific process requirements are illustrated. Selas Corp. of America.

147 Sectional Duct Furnace—Specifications and operating data on a new series of sectional duct furnaces are given in Bulletin B-55-DS. Includes a section on methods of installation and table of suggested combinations for achieving desired total capacity. Reznor Mfg. Co.

148 Fin Tubing—Bulletin 1300 is of interest to plant engineers concerned with fluids being heated, cooled or condensed by other fluids with different heat transfer characteristics. Tubing described has longitudinal fins which afford much greater exterior surface. More than a dozen ferrous and non-ferrous material combinations are tabulated. Bulletin also explains how tubes are made and gives sizes of fins and tubes. The Griscom-Russell Co.

SAFETY, FIRE PROTECTION

149 Signs for Safety—Illustrated in full color, this 48-pp catalog covers some 2200 stock metal signs and safety tags. The signs are made in ASA specifications for industrial accident protection, and some are available in foreign languages. Catalog also shows porcelain enamel and stainless steel letters in sizes to 24-in. high for constructing display signs, and includes a section on signs for specific accident prevention problems. Ready Made Sign Co.

150 Fire Hose Reels — Sixteen-pp Catalog H-511-F describes hose reels for fire fighting equipment, with illustrations of various models and cutaway view showing component features. Specifications, as well as descriptions of operational advantages are included. Clifford B. Hannay & Son, Inc.

MATERIALS HANDLING

151 Overhead Handling Installation — Bulletin M-29 is a 6-pp folder describing the flexible overhead handling installation in a 53-acre jet engine plant, and showing company's Trambeam crane and monorail equipment in use. Illustrations and text give useful handling ideas for application in other types of manufacturing plants, too. Whiting Corp.

152 Electric Hoists — Sixteen-pp Bulletin 410 presents design advantages and application information on company's Series 700 Load Lifter electric hoists. Available suspension equipment and control arrangements are discussed and full specifications provided for the hoists which range in capacity from 1000 to 12,000 lb. Shaw-Box Crane & Hoist Div., Manning, Maxwell & Moore, Inc.

153 Hand Lift Trucks—Bulletin 555-1, 6-pp, covers company's single stroke hand lift trucks, stressing the increase in capacity of trucks from 3500 to 4000 lb. Specifications are given, with line drawings showing distinctive features which provide easy operation, long life, safety and low maintenance. Operating views are shown. Barrett-Cravens Co.

154 Specialized Hand Trucks—Included in this catalog are product bulletins on a line of hand trucks and other movable handling equipment designed for specific jobs. Among products shown are safety ladder trucks, ladder-on-wash-tank trucks, high deck stock pickers, utility trucks. Rol-Away Truck Mfg. Co., Inc.

155 LPG Carburetion—Advantages offered by use of liquefied petroleum gas in operation of industrial trucks, etc., are presented in this illustrated folder. A typical L-P gas conversion is shown. Chicagomobile Power Corp.

TOOLS, WELDING AND METAL WORKING

157 Portable Electric Tools — This 1955 Standard Catalog, Form 10, 24 pp, features company's line of portable electric tools, including electric drills, bench-drill stands, hole saws, buffing and polishing kits, sanders, polishers, grinders, hammers, saw blades, vacuum cleaners, and others. Photos and full specifications included. The Black & Decker Mfg. Co.

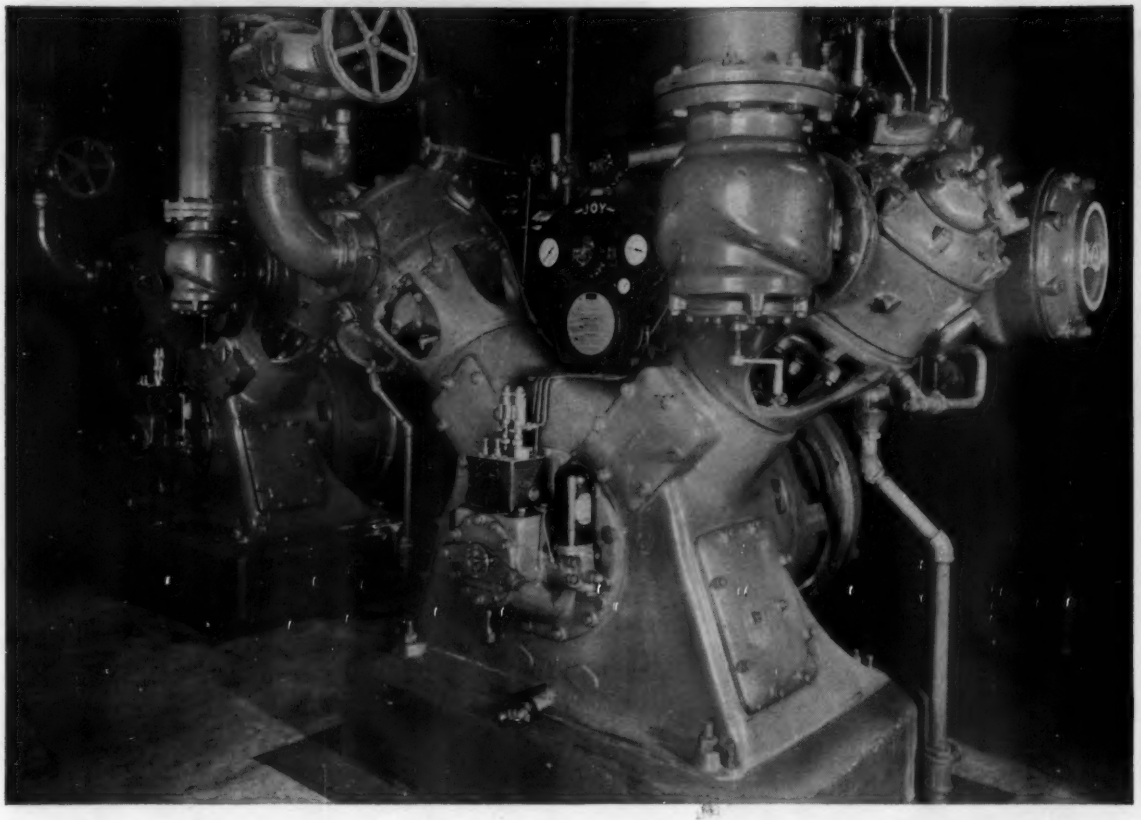
158 Electrode Selector Guide—To help select the proper Arcaloy stainless steel electrode to meet particular requirements, Bulletin AR-10, gives designations, electrode data and application data for 22 of most popular electrodes in company's line. Typical chemical analysis and physical properties, together with electrode identification (end and spot color), is given under electrode data column. Alloy Rods Co.

On pages 161-162 are two postage-free Reader Service Cards provided for your convenience in ordering these bulletins. You may also use the cards to order any literature mentioned in ads.

159 Abrasive Belt Machining—This 23-pp catalog, ST 1054-BB-25, describes in detail application methods of company's complete line of abrasive belt machines. Explains operation of the five types of abrasive belt machining, pointing out savings in time, labor, spoilage and space costs. Engelberg Huller Co., Inc.

160 For Abrasive Cutting—Technical data on Speed-Cut abrasive cutting machine is presented in this illustrated bulletin. Featuring both bench type and floor type models, bulletin includes data on length of cutting time for various shapes and types of materials, ranging from 2 in. pipe in 5 sec and 6 in. pipe in 40 sec to 2 in. cold rolled bar stock in 20 sec. Beaver Pipe Tools, Inc.

(More Bulletins on page 163)



The Case of the "GOOD AS NEW" COMPRESSORS

These two Joy WN-112 air compressors were used for several years in really heavy-duty operation under extremely tough conditions.

They were installed at different times . . . the newest about four years ago. Plant personnel report that, with nothing more than customary plant maintenance, they are still "good as new" and still furnishing, without shutdowns, the air to keep the plant in operation.

Durability and easy maintenance are built-in features of Joy WN-112 compressors. Cylinder and crosshead liners are field-replaceable, and made of alloy iron, honed to a mirror finish. Large area, low lift Joy "Dual Cushion" valves are set at the most efficient angle in both heads. Lubrication is by force-feed to all moving parts with automatic shut-off protection.

The Joy WN-112 is a heavy-duty, continuous service, two-stage, double-acting compressor of V-vertical design. It is normally powered by a flange-mounted motor but is adaptable to diesel, steam turbine, flexible coupling, V-belt or flat belt drive. It is a versatile machine and a compact space-saver in any plant.

For complete details on the Joy WN-112, write for Bulletin A-62 to ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario*

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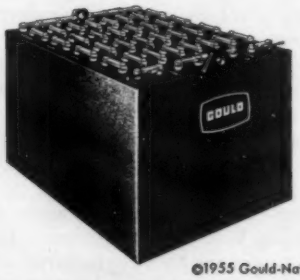
SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

For more facts circle 519 on Reply Card

"Battery Performance is my Business!"

Your Gould Field Engineer has one job—to make sure you get greatest possible service from your batteries. In performing that job he sees to it that your batteries are properly cared for and maintained; he instructs your personnel in systematic maintenance methods; he helps you anticipate battery needs; he makes sure you get maximum battery performance.

Gould Field Engineering Service is nation-wide. Every member is factory-trained . . . has plenty of on-the-job know-how. There's a Gould Field Engineer in your area. He's as near to you as your telephone. Call him. And when you see him, ask him for the new Gould Plus-Performance Plan material for your battery maintenance staff.



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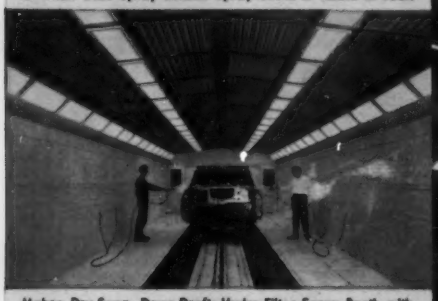
COMPLETE *Finishing* SYSTEMS

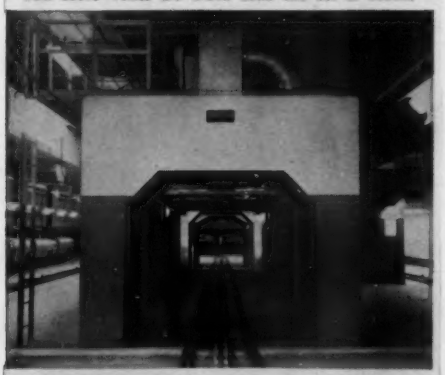
. . . for ENAMELS • LACQUER • PAINT • VARNISH

Interior of Mahon Pressurized Tack-Off Enclosure at entrance to Finish Coat Spray Booths. Spray Booth is visible in rear.



Mahon Dry-Sump, Down-Draft, Hydro-Filter Spray Booth with Remote Sludge Tank and Automatic Sludge Unloader.

Mahon Down-Draft Deadener Booth. Clean Filtered Air is supplied from above—Fumes are drawn down and out at bottom.



Mahon Dry-Off Oven with Cooling Tunnel at Exit End. Finish Baking Ovens are Similar with Multiple Controlled Heat Zones.

. . . the EXPERIENCE that goes into the PLANNING and ENGINEERING of MAHON EQUIPMENT is the item of GREATEST VALUE to YOU!

Over four thousand five hundred feet of conveyor carries automobile bodies through the various finishing operations in this Complete Mahon Single Production Line Finishing System.

WHY Do So MANY Manufacturers BUY Complete MAHON FINISHING SYSTEMS?

The answer to that question is very simple. In the first place, they want Mahon *KNOW-HOW*. In the second place, they want their entire finishing system planned, coordinated, engineered and installed by one responsible organization. In other words, they want one responsibility for final results—which are the quality and the cost of the finish on a product. Many things enter into these two end result items . . . most important are the operating efficiency and the operating cost of the finishing equipment. Most manufacturers have found that this is where the true worth of Mahon equipment shows up . . . it isn't built to a price, it is built to do a job. If you have a finishing problem, or are considering new finishing equipment, you, like thousands of other manufacturers, will find that Mahon engineers are better qualified to advise you on both methods and equipment requirements . . . and better qualified to do the all-important planning and engineering of equipment —which is the key to fine finishes at minimum cost. You will find also, that Mahon equipment is built better for more economical operation over a longer period of time—a factor to be weighed carefully when comparing initial cost figures. Mahon will do your complete job on one contract . . . undivided responsibility for the entire system insures proper coordination and safeguards you against complications which can upset your production schedules. See Mahon's Insert in Sweet's Plant Engineering File for information, or write for Catalog A-655.

THE R. C. MAHON COMPANY

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Engineers and Manufacturers of Complete Finishing Systems—including Metal Cleaning, Pickling, and Rust Proofing Equipment, Hydro-Filter Spray Booths, Dip and Flow Coaters, Filtered Air Supply Systems and Drying and Baking Ovens, Cooling Tunnels, Heat Treating and Quenching Equipment for Aluminum and Magnesium, and other Units of Special Production Equipment.

MAHON

For more facts circle 521 on Reply Card

OFF CENTER WEIGHT--
didn't damage bearings

--RUN AT FULL SPEED-
in this R&M motor!

They're still in perfect condition because they're ***extra large***

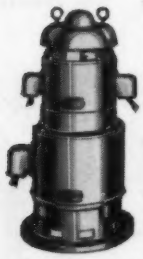
No motor bearing was ever submitted to a tougher test! We mounted a five-pound weight—2 inches off-center—on the shaft of a standard R & M "All-Weather" Motor, then turned on the switch. As you can imagine, that motor practically turned handsprings with over 1,000 pounds of centrifugal force being placed on the bearings. It must be recognized also that this is all side-strain on the bearings. After twelve solid hours of this punishment, the R & M bearings were found to be in perfect condition!

Here's a dramatic example that shows how extra-large, fully sealed R & M bearings pay off in rugged service. By "extra large" we mean bigger diameter than you usually find in a motor bearing . . . double-row race width . . . bigger balls that withstand greater load.

You'd never treat a motor this way, of course. But, *in terms of years of service*, a bearing with stamina like this is a bearing you can *forget*. We build oversize bearings into all R & M "All-Weather" Motors—*at no extra cost to you*—as just one more precaution against any chance of failure later on.

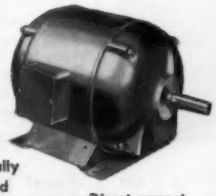
From 1 to 200 Horsepower . . .

if it's an R & M, it's the Right Motor!



Frequency converters and alternators, 2½ to 15 kw.

Explosion-proof totally enclosed fan-cooled 1 to 40 hp.



Direct current motors 1 to 7½ hp.

Capacitor single-phase motors 1 to 15 hp.

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Mail the coupon today—for more information on the finest motor your money can buy!

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PE

Please send illustrated Integral Horsepower Motor Catalog, showing all the extra features of R & M "All-Weather" Motors that are furnished at a standard motor price. We are also interested in:

- ☐ Explosion-Proof Motors
- ☐ Totally Enclosed Fan-Cooled Motors
- ☐ Capacitor Single-Phase Motors
- ☐ Frequency Converters & Alternators

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*Company*_____

*Address*_____

*City*_____ *Zone*_____ *State*_____

"All-Weather" is an R & M trademark

For more facts circle 522 on Reply Card

"WE'VE FOUND THIS LUBRICANT BEST FOR FISH PROCESSING MACHINERY"

says HIGH SEAS Tuna Packing Co., Inc. of California

"We have used LUBRIPLATE Lubricants for over 15 years and find they do everything. They keep fish processing machinery from seizing and keep it easy to take apart and reassemble. This is very important in food processing plants. Because LUBRIPLATE Lubricants are so effective, economical and long-lasting, they save us time and money."

Earl Lockhart
Master Mechanic

REGARDLESS OF THE SIZE AND TYPE OF YOUR MACHINERY, LUBRIPLATE GREASE AND FLUID TYPE LUBRICANTS WILL IMPROVE ITS OPERATION AND REDUCE MAINTENANCE COSTS.

LUBRIPLATE is available in grease and fluid densities for every purpose... LUBRIPLATE H. D. S. MOTOR OIL meets today's exacting requirements for gasoline and diesel engines.

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For more facts circle 523 on Reply Card

BACKTALK about our past issues

Edited by R. L. Marinello

More Facts About Filter

PLANT ENGINEERING:

"On page 115 of the May, 1955, issue of PLANT ENGINEERING you published a description of a high efficiency dust collector using glass marbles.

"I would like very much to have any additional information you have, or may be able to direct me to, on the performance and results of this apparatus." *C. U. Savoye, Executive Assistant, The Babcock & Wilcox Co., New York, N. Y.*

▶ Your request for additional information, along with the many others we have received, has been forwarded to Mr. A. I. Hurd, Russell T. Gray, Inc., 155 N. Wacker Drive, Chicago 6, Illinois, who will send you information.—*Editors.*

May Be Answer to Problem

PLANT ENGINEERING:

"We presently have in our plant a 40 hp motor driving a log haul-up chain through a 17.50 fluid coupling. The only overload protection we have in this system is a shear pin.

"The article on 'Flexidyne' in the April, 1955, issue of PLANT ENGINEERING leads us to think that you may possibly have an answer to our problem. It is our understanding from reading this article that this product eliminates the use of a shear pin and that the unit can be set to slip at a certain overload. Will you please arrange to have the manufacturer send us prices and availability of the correct size unit." *W. L. Shepherd, Assistant Supt. Mech., Newport Industries, Inc., Oakdale, Louisiana.*

▶ Further information on this product will be forwarded to you by Mr. Ralph Hanes, Dodge Manufacturing Corp., Mishawaka, Indiana.—*Editors.*

Oops! Isotopes Go Awry

PLANT ENGINEERING:

"We have been literally bombarded by a number of requests for information on a portable device for measuring the density and moisture content of soils and other applications which incorporate radioactive isotopes.

"I wonder if you could send us a reprint of the article in which our competence in this field is indicated, because we suspect that there must be some misunderstanding about what we have actually developed or are reputed to have developed." *K. O. Donelian, Nuclear Development Associates, Inc., White Plains, New York.*

▶ This all came about from an article which was published in PLANT ENGINEERING, entitled "Industrial Isotopes—A Review of Their Uses."

At the time, we had a false lead which told us that your company was the manufacturer of this device. As it turned out, your company was mentioned as the source inasmuch as one of your research men was responsible for the development. Therefore, we had forwarded to each inquiring reader a sheet listing your firm among others as the manufacturer or at least a source from which further data could be obtained.

Since then we have discovered our error and now list Nuclear Instrument and Chemical Co., 223 West Erie, Chicago, Illinois, as the manufacturer.

Please accept our apologies for having put you to this trouble, but perhaps it has been reassuring to you to know of the interest in nuclear development for industrial purposes.—*Editors.*

Requests for Preprint

PLANT ENGINEERING:

"Will you please send me five copies of the article entitled 'Machine Works from "Memory"' which is appearing in the July, 1955, issue." *Budd A. Reesman, E. R. Hollingsworth & Associates, Rockford, Illinois.*

PLANT ENGINEERING:

"We would be grateful to receive an additional two copies of the preprint from your issue of July, 1955, pages 102 through 104, describing a system of automatic machine tool control." *R. H. Davies, Ferranti Electric, Inc., New York.*

Court Brief Reference

PLANT ENGINEERING:

"In the Court Decisions department in your April, 1955 issue, we were interested in the article on Patent Infringement.

"Will you please advise if the Alabama manufacturer who was found to be the guilty party owned the patterns for the castings involved in the infringement. If not, would you please send more detailed information on this case, or advise where we may find brief of case." *Paul L. Ashwood, Plant Engineer, Missouri Portland Cement Co., St. Louis 8, Missouri.*

▶ The case reference of this brief is: Southern States Equipment Co. vs.

BETZ • *A Great Name*
In Water Conditioning

Engineer at work!

If you were to walk into the Engineering Department of our Philadelphia headquarters, chances are you'd see a vacant desk or two like this. And for good reason!

The engineer who occupies this desk might be in Maine, California, Texas . . . anywhere in the country providing supplemental assistance on water problems . . . helping your *personal* representative, the Betz District Engineer and *you* to do a better job in your plant.

He's one of a group of over 20 Betz specialists that make up our fully-staffed Engineering Department . . . providing *additional* headquarters engineering support as well as in-the-field engineering as required.

It is the responsibility of the Betz Engineering Department to carefully analyze the many facets of information concerning your water problems . . . to engineer, interpret, and diagnose the situation as it exists in your plant . . . and to work with the Betz District Engineer to recommend the correct steps to overcome the difficulty.

This *complete* engineering service is another reason why Betz *continues* its leadership in providing sound engineering on all water problems. It will pay you to talk with a Betz District Engineer today. No obligation, of course.

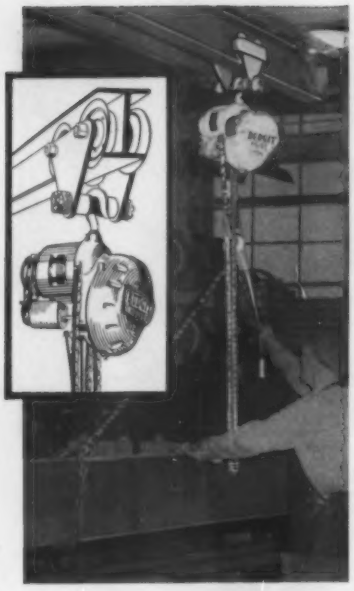
W. H. & L. D. BETZ, Gillingham & Worth Streets, Philadelphia 24, Pa.

In Canada: BETZ Laboratories Limited, Montreal 1.

BETZ

CONSULTANTS ON INDUSTRIAL WATER PROBLEMS

For more facts circle 524 on Reply Card



SAVE THIS FAST, EASY WAY

Cut load handling costs and production costs go down. To achieve this result, the 'Budgit' Electric Hoist is working at machines, in assembly and at inspection stations in more and more plants everywhere. It saves time and effort. The ¼-ton size can lift a 500-lb load one foot in less than two seconds. A slight pull on the control cord starts this fast action. And, electricity to operate the 'Budgit' all day costs only a few cents.

Let 'Budgit' economy save money for you. It's a complete lifting unit in itself — comes ready to hang up, plug in, use. No accessories to buy. No installation expense. Get the whole story of the tough, safe 'Budgit' Electric Hoist. Capacities: 250 to 4,000 lbs. AC and DC models. Prices: $139 and up. Call your "Shaw-Box" Distributor or write for Bulletin 391.

'BUDGIT' I-BEAM TROLLEYS enable a hoist to travel as well as lift the load. Made of tough steel. Ball bearings in wheels. Adjustable to fit various I-beam sizes. Capacities: 500 to 4,000 lbs. Priced from $15.50. Write for Bulletin 390.

'Budgit' ®

ELECTRIC HOISTS

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' and 'American-Microsen' Industrial Instruments, and Aircraft Products.

For more facts circle 525 on Reply Card

BACKTALK

U.S.C.O. Power Equipment Corp., U. S. Court of Appeals, 5th Circuit, December 31, 1953, on appeal from a decision of the U. S. District Court, Northern District of Alabama, 209 F. 2d 111.—*Editors.*

Multi-Purpose Electrode

PLANT ENGINEERING:

"Please refer to page 87 of your May, 1955, issue wherein you refer to 'Multi-Purpose Electrode.'

"We are interested in this item and shall appreciate information regarding the manufacturer, cost and availability, also if the manufacturer is represented in the Los Angeles area." *R. C. Hensel, Manager, Purchasing-Stores, Shell Chemical Corp., Los Angeles, California.*

PLANT ENGINEERING:

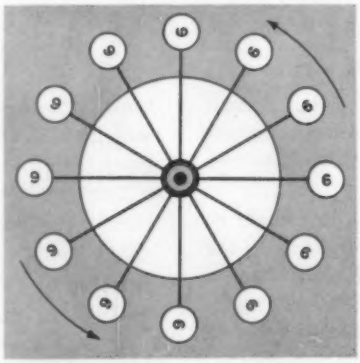
"Will you please send all information available on 'Multi-Purpose Electrode.' Please furnish chemical analysis along with other information, also where available." *J. V. Dunbar, Chief Inspector, E. I. du Pont de Nemours Co., Augusta, Georgia.*

► More information on this electrode will be sent to you by Mr. John V. Moran, Jr., International Nickel Co., 67 Wall St., New York 5, N. Y.—*Editors.*

Perpetual Motion Machine?

PLANT ENGINEERING:

"In 1937, C. H. Woodhouse, then chief engineer for Burns & Co., Ltd., of Prince Albert, Saskatchewan, Canada, discovered the perpetual motion machine in an



English Mechanic magazine, dated 1903.

Metal balls are placed on the ends of all 12 arms, or spokes. Note that there is always a 6 lb ball going up as a 9 lb ball comes down—if you can believe what you see!" *R. R. Taggs, E.E., Jackson, Michigan.*

Water Troubles and Cures

PLANT ENGINEERING:

"We understand that there was an article that appeared in your January, 1955, issue, covering methods and diagnosis and choice of remedies for various types of industrial waters.

"The information we have indicates that there were five pages of this article.

"We would like to get a copy of this edition, please, and if you will send it to us, let us know the cost and we will reimburse you promptly." *A. W. Pugsley, President, The North American Mogul Products Co., Cleveland, Ohio.*

► The article you inquire about is entitled "Water Always Causes Trouble," by Dr. Everett P. Partridge of Hall Laboratories, Inc. Rather than send you a copy of the magazine, we thought you would prefer having just the reprint which was prepared because of the number of requests we received.—*Editors.*

Interested in Illustration

PLANT ENGINEERING:

"We noted with considerable interest an illustration of what appears to be our Flexaust hose on page 90 of the May, 1955, issue of PLANT ENGINEERING.

"Since we manufacture Flexaust and Portovent hose equipment, we found the cooling application which the article illustrated a good one. We would like to obtain permission to use it if we can." *T. G. May, Sales Manager, The Flexaust Co., New York, N. Y.*

► We are pleased to forward to you the photograph requested. We assume that the Radio Corp. of America would have no objection to your using the photograph and we can only suggest that you contact their public relations office in New York City.—*Editors.*

Tear Sheet Request

PLANT ENGINEERING:

"Will you please send me a tear sheet on 'Chips Fall, Dust Flies but Area Stays Clean,' written by Mr. J. A. Scattaloni of the Westinghouse Corp. It appeared in the March, 1955, edition." *Arthur G. Paule, Supervisor, Factory Layout Department, Wagner Electric Corp., St. Louis, Missouri.*

Interested in Types of Service

PLANT ENGINEERING:

"In your February, 1955 issue there was an article entitled 'Seepage Problems' by John P. Gnaedinger of Soil Testing Services, Inc.

"We are interested in receiving more information about the types of service available from the author's company. If you are able to furnish the complete address of the company, we will appreciate receiving further information." *J. N. Davidson, Plant Engineer, The Procter & Gamble Mfg. Co., Baltimore, Md.*

► The complete address of the company is: Soil Testing Services, Inc., 3521 North Cicero Avenue, Chicago 41, Illinois. We have referred your request to one of the company's representatives and we are certain you will hear from him in the near future.—*Editors.*

Wherever you look AT THE MACHINE TOOL SHOW YOU'LL FIND

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E. W. Bliss Company
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The Cleveland Automatic Machine Co. — BOOTH #412

CONSOLIDATED MACHINE TOOLS
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EDLUND
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Famco Machine Company
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Federal Press Company
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Greaves Machine Tool Co.
BOOTH #721

speeds installation of any machinery protects accuracy of precision machines

These machine tool builders cut set-up time at the Machine Tool Show from hours to minutes with BARRYMOUNT® Leveling Isolators. No drilling floors, no setting lag bolts, no shimming — they just set their machines on the Barry mounts, adjusted the leveling screws, and the normally tedious, costly job was done.

This is not just a show trick — it's a standard efficiency procedure for new installations and re-installations in large and small plants all over the country. And, *at the show or in your plant,* the isolation built into Barry mounts protects precision machines against vibration from nearby heavy equipment.

Visit us at Booth 153, Production Engineering Show, and a Barry engineer will show you how *you* can simplify installation, protect machine accuracy, prolong machine life, and cut maintenance costs with Barry Machine Mounts.

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The Motch & Merryweather Machinery Co.—BOOTH #606

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Onsrud Machine Works Inc.
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RACINE
Racine Hydraulics & Machinery Inc.
BOOTH #102

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✓ Industry wipes out corrosion with Firestone Exon Resins

Tons of caustic corrosives...BUT...

NO COSTLY CORROSION!

Put a corrosive alkali with so chemically active a gas as chlorine and you get not only an extremely powerful industrial bleach, but considerable corrosion in metal equipment!

No such worries at Murro Chemical Co., Portsmouth, Va. Their sodium hypochlorite tanks (4′ high, 3′ in diameter) were designed by Amroc, Inc., New York City. A Vyflex L-10 tank lining 3/32″ thick, applied by La Favorite Linings, Inc., Hawthorne, N. J., made all interior surfaces, inlets, outlets, and flange connections corrosion-proof. Once again—corrosion costs are wiped out by material based on Exon resins.

- - -

VYFLEX L-10 derives its immunity to corrosion from its base resin, Exon 900 series. These are only a part of the many Exon resins developed by Firestone engineers to wipe out corrosion costs.

In plant after plant, lightweight structural rigid applications of unplasticized PVC are based on equally effective resins in the ever-growing EXON line.

The fact is, you *can* stop corrosion! Exon PVC resins provide a wide variety of materials to develop the answer to your specific problem.

*Vyflex L-10 is made from Exon resins

*Product of Kaykor Industries, Inc. Division of Kayo-Tex Mfg. Corp., Yardville, New Jersey

Firestone

For details to answer your particular need, call or write:

CHEMICAL SALES DIVISION

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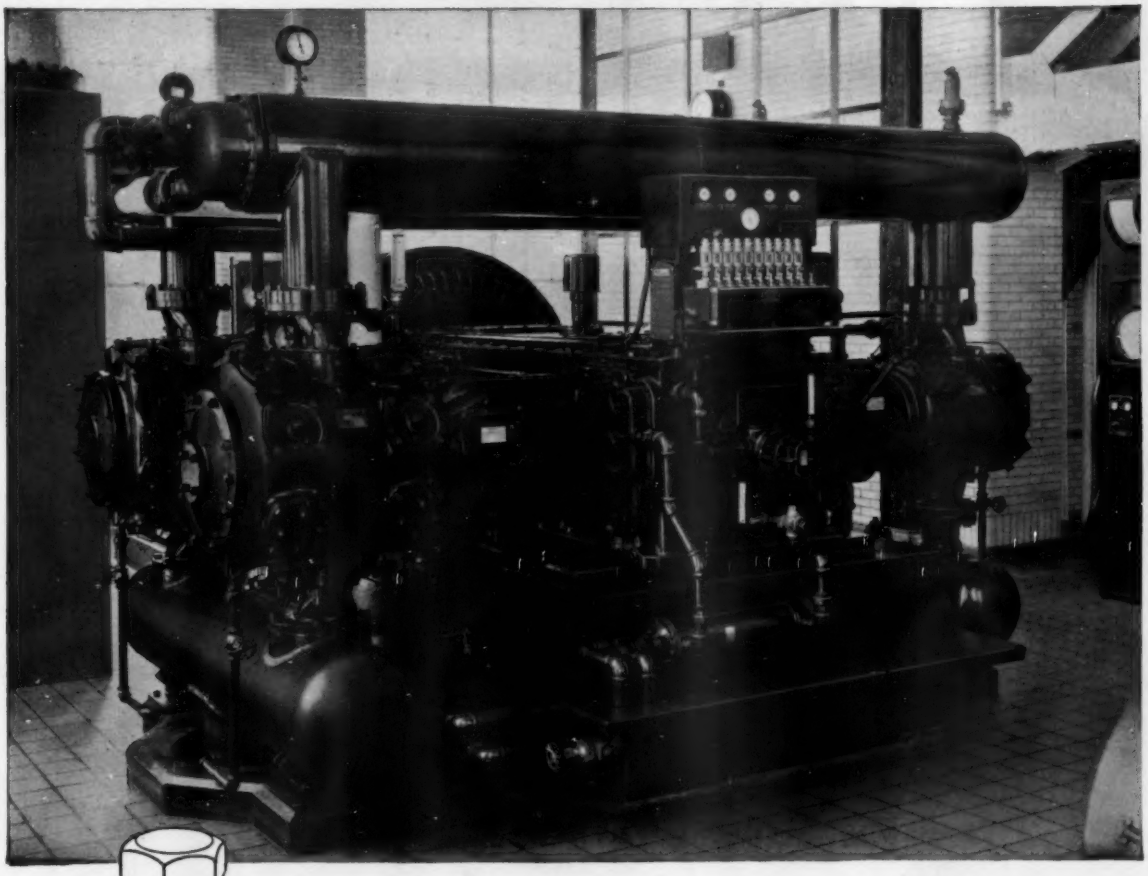

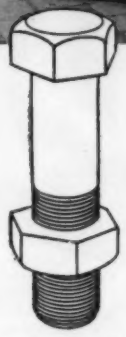

JUST BOLT IT TO THE FLOOR

that's all Ford had to do

Expanding operations at Ford Motor Company's assembly plant in Buffalo, N. Y. demanded additional shop air capacity. It had to be installed quickly and, if possible, without disruption to existing facilities.

Inasmuch as the installation was to be on the second floor of the power house, Ford engineers selected a Clark CMA-4, 350 horsepower, Balanced/Opposed Compressor. The low installation cost was an important factor.

With the Clark motor-driven unit, it was unnecessary to run foundations all the way down to the basement. Piping, which was beneath the proposed compressor location, did not have to be moved.

Because of the perfect balance of the Clark unit, it was possible to mount the motor and compressor on a steel sub-base which was bolted to floor I-beams. No foundations were required. No pipes were relocated.

. . . nor was there any lost production. The Clark unit was tied in over a weekend.

The Buffalo assembly plant is but one of many Clark Compressor installations serving the Ford Motor Company's vast operations.

Before you consider any proposed compressor location *impossible*, it may save you money to talk it over with your nearest Clark representative. In the meanwhile, make sure you have Bulletin 118 in your files. Write today.

CLARK BROS. CO. • OLEAN, N. Y.

One of the Dresser Industries
Sales Offices in Principal Cities Throughout the World

PRECISION BY THE TON **CLARK** **balanced/opposed compressors**
150-4500 HP

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One easy

HEATING CHEC
UNIT HEATE
SPACE HEATE
WALL FIN HEATE
CONVECTORS
PUMPS
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FANS
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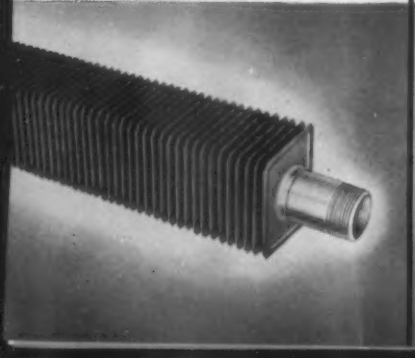
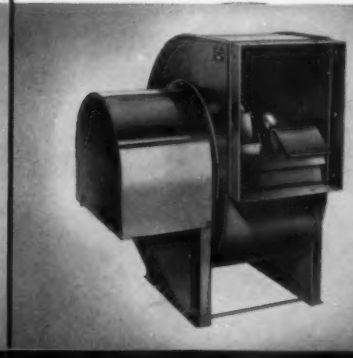
STRAINERS
FOR HIGH CEILINGS TRANE Projection Unit Heaters have exclusive Louver Cone Diffusers that give up to 60% greater distance of throw. Diffuser "steers" heat in any desired direction, gets it down to working levels for maximum comfort.
Joe— We can get all these from Trane—

To stop drafts from skylights, windows, TRANE Wall-Fin fits in where other types of radiation can't. Resists factory abuse, vibration. Attractive enclosure available. Hanger permits coil expansion and con traction . . . noiselessly!



For "Built-Up" Systems, TRANE Coils have new Delta Flo Fin which eliminates stagnant air next to fin surface, increases heat transfer capacity. Mechanical fin-to-tube bond is as strong as the metal itself. Special steam coils with Kinetic Orifice guard against freeze-up.

For moving air, TRANE Fans have lower hp requirements, save power. Streamlined fan inlet cone assures even air distribution in fan wheel, eliminates noisy, power-wasting turbulence. FC and BI fans available to 330,408 cfm. Complete line of utility fans, direct or belt-driven, to 15,450 cfm.

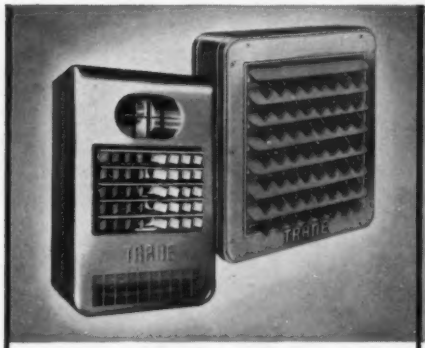


answer to all

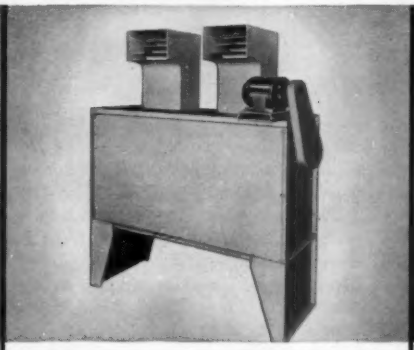
your heating checkup problems:

One source — Trane — saves time, simplifies maintenance, concentrates responsibility

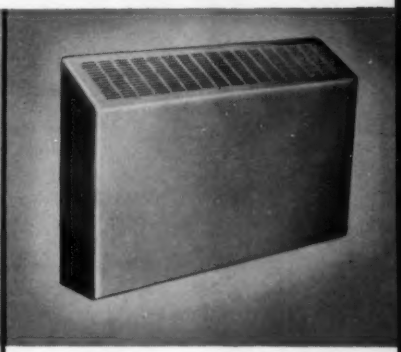
You name your heating and ventilating need. TRANE can supply it. It's as simple as that. No need to wade through countless catalogs . . . no need to split your order, divide responsibility. And since TRANE products are built for use *together*, you can count on the same reliable service from every TRANE product throughout your plant, year after year after year! *Matched* products simplify maintenance, too . . . make it easy to pinpoint responsibility. Contact your nearby TRANE Sales Office, or write TRANE, La Crosse, Wisconsin.



To put heat where you want it TRANE Horizontal-Discharge Unit Heaters with exclusive Louver Fin Diffusers can give gentle blanketing or spot throw. Steam models have coils with permanent *mechanically bonded* fin and tubes. Gas-fired units have boiler-tube type heat exchanger . . . no gaskets, no furnace cement.



For space heating and ventilating TRANE Torridors with powerful centrifugal fans, choice of 20 nozzle arrangements, distribute filtered, warmed air over large areas. Can deliver air through ducts to smaller rooms, hold accurate temperatures for process applications. Models for horizontal, vertical, or inverted installation.



For offices, stair wells, corridors, TRANE Convectors can be installed wall-hung (shown), free-standing or recessed. Aluminum-copper heating element is more efficient, saves fuel. Eleven cabinet styles with flat or sloping top. Come assembled ready for fast installation.

Wherever steam is used TRANE Steam Specialties can save fuel, boost production. TRANE Float, Thermostatic and Bucket Traps get more heat out of steam. Lifetime Valve guaranteed against stem leakage. TRANE Vents stop air binding. TRANE Strainers ideal for dirty lines.

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One source, one responsibility for: Air Conditioning Heating • Ventilating • Heat Transfer Equipment

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Edited by M. E. Weissman

Efflorescence on Concrete—Treatment and Prevention

EFFLORESCENCE is a growth of crystals on the surface and in the pores of masonry and concrete where a salt solution has evaporated. The source of the salt may vary but in most cases, it is leached from the masonry or concrete by water.

The amount and character of the deposits vary widely, depending on the nature of the soluble materials and atmospheric conditions. The appearance of efflorescence is noted more frequently after a long rainy spell followed by a drying-out period. In summer, the rain evaporates so quickly that comparatively small amounts of the salts are brought to the surface.

Efflorescence will appear on concrete surfaces of slabs when capillary moisture can travel through the concrete and on the inner sides of backfilled walls when moisture or hydrostatic pressure permits water to penetrate the concrete.

Hydrated cement contains some calcium hydroxide (hydrated lime—which is soluble) as an inevitable product of the reaction between cement and water. When this soluble material is brought to the surface by water, it combines chemically with the carbon dioxide in the air forming calcium carbonate (limestone) which is very slightly soluble. As a result, it remains on the surface as a whitish deposit known as efflorescence. Subsequent wetting of the concrete does not remove it, because of its low solubility.

Since efflorescence is an indication of absorption, any preventive measure must limit absorption to the point where insufficient water enters the concrete to dissolve the soluble salts and transport them to the surface. Low absorption is the best assurance against efflorescence. Concrete made from properly graded aggregates, with low water content, thoroughly compacted and properly cured, will have minimum absorption.

While calcium carbonate efflorescence is practically insoluble in water, it may be dissolved by a dilute solution of muriatic acid (1 part concentrated acid to 5 to 10 parts water).

Surfaces should be thoroughly wetted with water before acid is applied and after treatment they should be immediately and thoroughly washed with water. The acid wash should be tried out on a small inconspicuous section to note its effect before pro-

(Continued on page 38)

Patterns in Plaster Are Fashioned for Foundry Use

BECAUSE PLASTER will not warp or shrink when it comes into contact with the damp sand used in foundry operations, it is being used in preference to wood in making patterns for kirksite dies.

About five tons of plaster, in addition to clay, burlap, wire and sisal fiber are used monthly patterns.

The pattern originates on a drawing board where templates are designed. In the pattern department, these templates are used as masters from which other, slightly larger templates are made to allow for shrinkage in the finished product.

The templates are wired into a skeleton of the pattern and strengthened with burlap dipped in plaster. More plaster is then shaped to the contours of the surfaces between the templates to form a model of the actual part that will later be made from the dies.

Next step is to build plywood walls around the model. From these, the pattern is molded with plaster mixed with sisal fiber which helps mold the plaster in place and strengthens it after the plaster hardens. The one-inch-thick, hollow pattern hardens in 20 minutes.

Finally, the part number is stamped on the pattern which is then sent to the foundry. *From Bell Aircraft News, published by Bell Aircraft Company, Buffalo, N. Y.*

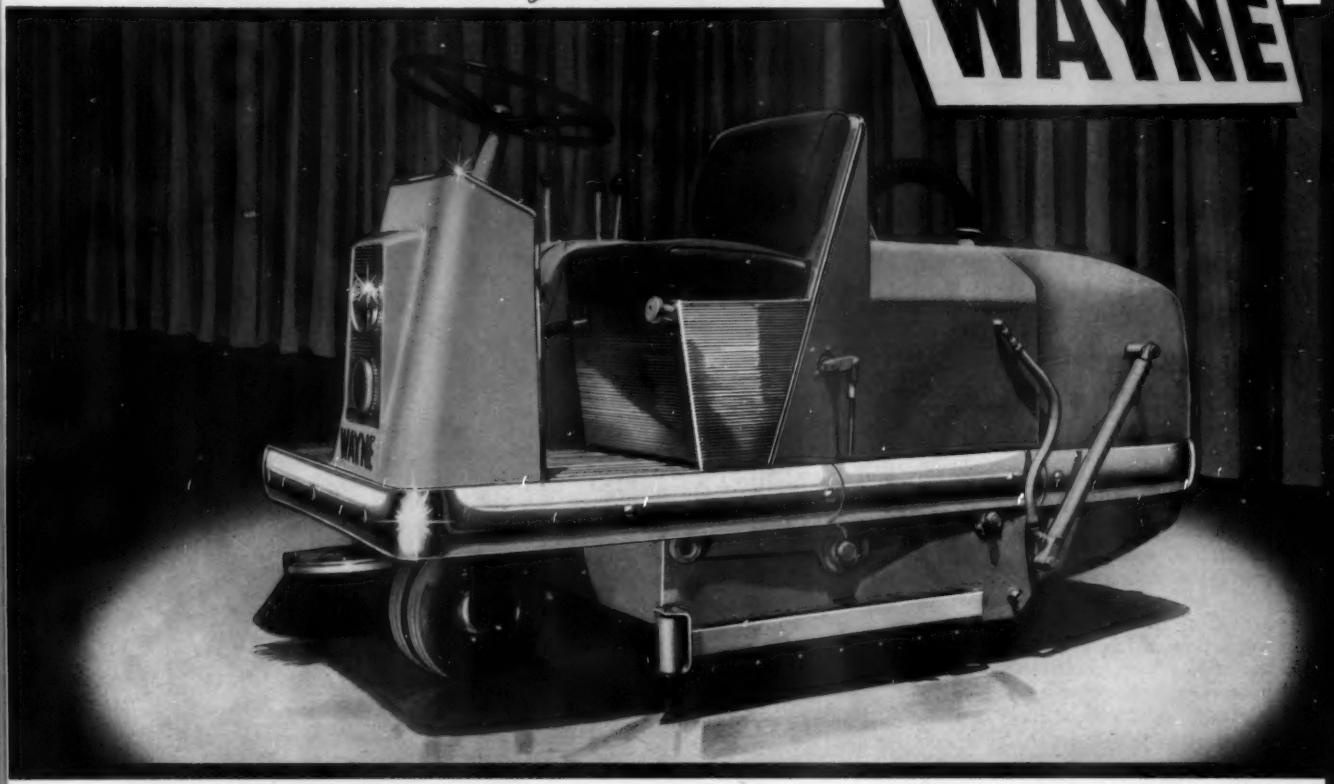
Clay retaining wall is prepared and rough edges smoothed on this mock-up

Trim lines marked on hardened plaster

For more facts circle 530 on Reply Card ——→

Announcing the new

WAYNE



Sweeps over 100,000 square feet per hour!

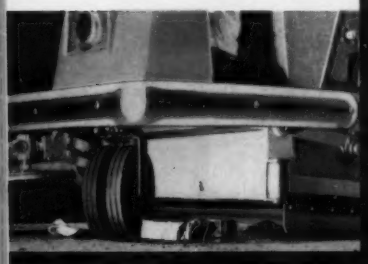
World's Finest most advanced power sweepers!

Completely new years-ahead power sweepers engineered to outlast, outperform any other sweeper!

Only the producers of the famous Wayne Street Sweepers could make a power sweeper so rugged, dependable and efficient. It's *performance* that counts, and these exclusive features make the new Wayne the most economical and practical power sweeper you can buy! • New Advanced design with automotive-type steering affords greater maneuverability. • Largest Hopper Capacity. • Vacuum Cleaning Hose Connection. • Extra Power gives greater sweeping capacity, ability to climb the steepest grades.

"power-flex" action

Enables Wayne to pick up larger objects or to travel without sweeping if desired.



power dumping

Hydraulically operated while driver is seated. Disposes of refuse in one quick, simple operation.

"filter-vac" dust control

A revolutionary new design principle. High velocity fan deposits fine dust into main dirt hopper automatically. No dust bag to empty.

"reach-easy" controls

All control levers can be operated by driver while seated. Provides for maximum safety and control.

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World's Largest Producer of Power Sweepers for Cities and Industry

Write for new illustrated literature and further information to: WAYNE MANUFACTURING CO.
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PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

ceeding with the remainder of the job.

Extreme care should be exercised in handling acid in any dilution. Protect eyes, hands, clothing, etc. Have water handy and flood immediately any accidentally splashed acid. *From This Earth, published by Permanente Cement Company, Oakland, California.*

Variety of Trucks Cuts Transportation Costs

Lift truck enters road vehicle to pick up and transfer skids to receiving dock

EXCESSIVE freight rates, inaccurate counts and the necessity for many workers to handle chores, were problems faced in the receiving and storage of incoming castings by a manufacturer of automobile engines. Formerly, the castings, dumped into railroad cars at the foundry, upon their arrival at the engine assembly plant had to be sorted, counted and manually loaded into push carts for movement to storage. Transportation costs were unusually high, manual methods consumed valuable time and faulty inventory records were inevitable.

Now, each class of castings, placed in special skid boxes at the foundry, is delivered by road truck to the assembly plant, where a low lift truck directly enters the road vehicle and transfers the skids to the receiving dock. From here a high lift vehicle either double stacks the skids in storage or moves them to production machines. Fork trucks are also used for handling either skids or pallets.

Machine productivity has increased 100 per cent over former hand unloading, since skid boxes with swing-up end doors are now placed on special tilting racks to allow the contents to flow onto a table within easy reach of the operator.

Mechanized handling of castings has cut transportation costs 50 per cent; manual labor has been eliminated entirely, freeing men for more important jobs. Incoming loads are now handled eight times faster.

A road unit of 12 skids is unloaded in 15 minutes by the industrial trucks as compared with several hours by previous manual methods. Within the plant, inventories are accurate at all times. From a release of *The Elwell Parker Electric Co., Cleveland, Ohio.*

Plastic Safety Guard for Forming Machine

Strong Plexiglas shield in front of forming machine combines complete protection with full visibility and protects operators from possible lashing metal should the extruded bar break during stretching. Shield was installed by our engineers. (From Bell Aircraft News, published by Bell Aircraft Corp., Buffalo, N. Y.)

Aluminum-Coating Wire

CONTINUOUS hot-dip aluminum coating process for iron and steel wire, based on the fluxing action of complex salt compounds applied to the wire surface from a hot aqueous solution, has been developed.

The process, which is practicable from a production standpoint as well as economical in cost, consists of: preheating; cleaning and pickling in hot acid solutions; rinsing in hot water; application of flux by immersion of wire in a hot aqueous salt solution; and immersion in a molten aluminum bath.

Drawing aluminum-coated steel wire

After preheating, immersion of the preheated wire in acid cleaning and pickling solutions permits the rapid removal of all oxidized surface contaminants. Surface soil, if permitted to remain on the wire, imposes a barrier to the intimate contact of the molten aluminum with the wire surface, thus preventing the application of continuous coating. Best results have been obtained with hot hydrochloric acid solutions, the temperature and concentration of which depend upon wire size, speed of travel, length of acid pickling tanks, nature of the wire surface, etc.

Following acid cleaning and pickling, the wire is thoroughly rinsed in hot water to remove iron salts and adhering dirt.

The flux utilized in the aluminizing

Wherever throw-off, drip or squeeze-out is a problem...

USE SUNTAC OIL

OIL LEAKAGE MEANS:
higher lubrication costs
messy machines
hazardous oil slicks on the floor

SUNTAC OIL:
cuts leakage
lowers oil costs
minimizes hazardous floor conditions

In addition to its leak reducing properties, Suntac has all the high quality of expensive general-purpose oils. Suntac is fortified against oxidation to assure long oil life and against rust and corrosion to protect valuable machines. And, last but not least, because the leak-reducing agent is 100% petroleum, Suntac leaves no gummy film or residue.

For more information about Suntac, the oil especially made to prevent drip, throw-off and squeeze-out, see your Sun representative or write for your copy of Suntac Technical Bulletin to Sun Oil Company, Philadelphia 3, Pa. Dept. PY-8.

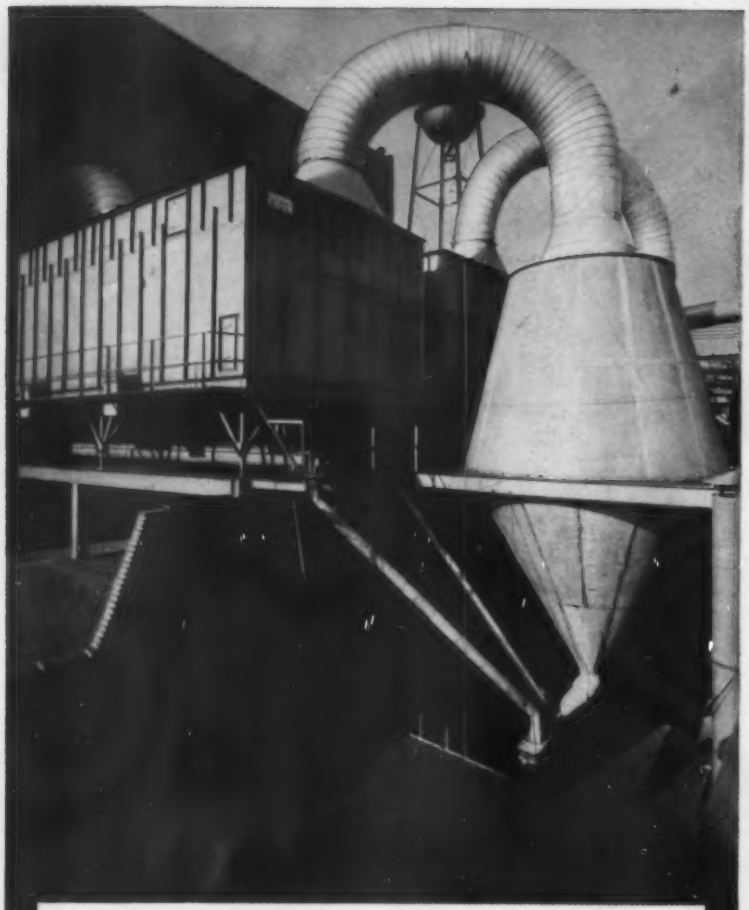
SUNOCO®

INDUSTRIAL PRODUCTS DEPARTMENT

SUN OIL COMPANY

Philadelphia 3, Pa.

IN CANADA: SUN OIL COMPANY, LTD., TORONTO AND MONTREAL



Dust got their goat at Amalgamated!

Pangborn rids plant of goatskin dust, gets higher production at lower cost.

Processing 25,000 goatskins daily created a serious dust problem for Amalgamated Leather Co., Wilmington, Del. Dust was so thick during the buffing operation that workers had to stop every half hour to clean up. Pangborn Dust Control solved this problem. The atmosphere during buffing is now clean. Workers do better, *continuous* work. Plant and machinery maintenance costs are lower. No wonder Amalgamated says Pangborn is "really doing a job"!

Pangborn can solve *your* dust problem. Pangborn engineers will be glad to show you how Pangborn Dry or Wet Dust Collectors can save you time, trouble and money!

See how Pangborn benefits varied industries. Write for free copy of "Out of the Realm of Dust." Pangborn Corp., 3200 Pangborn Blvd., Hagerstown, Maryland.

Pangborn CONTROLS DUST

For more facts circle 532 on Reply Card

PLANT ENGINEERS' DIGEST

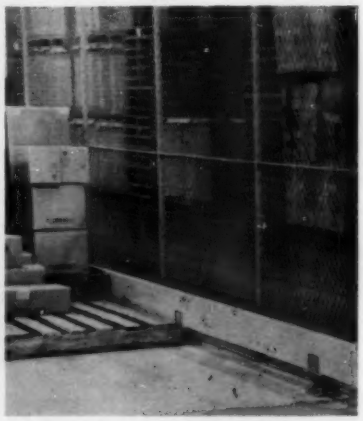
(Digest begins on page 36)

process is a hot aqueous solution of zirconium or titanium fluorides or complex zirconium or titanium fluoride compounds with an alkali metal such as sodium or potassium. The temperature and concentration of solution may be varied to suit the wire.

The fluxed wire enters the molten aluminum bath, passes under a suitable sinker, and leaves the bath vertically to assure uniformity of coating. Thickness of the aluminum-iron alloy layer depends upon the length of time the wire remains in the bath.

The molten metal is contained in a low frequency electric induction furnace. Commercially pure aluminum or aluminum to which alloys have been added may be used. A molten bath of commercially pure aluminum may be maintained at a temperature of 1250 to 1400 F for the application of satisfactory coatings; the addition of some alloys permits a reduction in the operating temperature consistent with the amount added. *From a release for Page Steel and Wire Div., American Chain & Cable Co., Inc., Bridgeport, Connecticut.*

Truck Stop



Property damage was reduced at A.B. Dick Co., with installation of X barriers, bolted to floor in front of walls and screens, making an automatic stop for trucks. (From a release for Fred Ex Enterprises, Incorporated, Chicago, Ill.)

Plastic Skin for Building

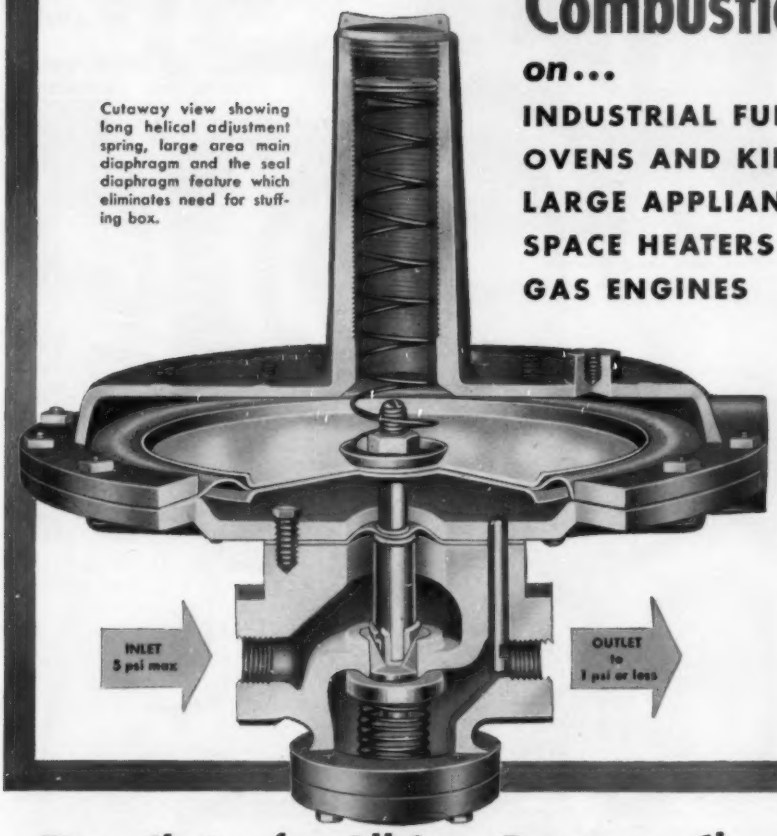
A PLASTIC SKIN, instead of conventional veneer materials, was applied to a Tyler, Tex., hotel to provide a weatherproof, smooth and flexible finish. The skin, 0.030 to 0.035 in. thick and covering 40,000 sq ft, was

Looking for **Improved Combustion Control?**

on...

INDUSTRIAL FURNACES
OVENS AND KILNS
LARGE APPLIANCES
SPACE HEATERS
GAS ENGINES

Cutaway view showing long helical adjustment spring, large area main diaphragm and the seal diaphragm feature which eliminates need for stuffing box.



Look into

Rockwell "120"

Gas Pressure

Regulators

First Choice for All Low Pressure, Close Control Services

When you need extremely accurate combustion control over pressure ranges of from 1 psi to zero or even vacuum, the Rockwell "120" regulator will serve you best. The extra large main diaphragm and friction-free seal diaphragm provide a construction unmatched for sensitivity and response. The "120" regulator adapts readily to special applications. For example, you can use it as a back pressure regulator, a pressure relief valve, a non-return valve, a flow controller, a shut-off valve or a proportioning control. In many services remote control can be applied. Flanged or screw ends available.

NEW BULLETIN *Use the handy coupon for literature, a quotation or free engineering assistance.*

YOU CAN RELY (ROCKWELL) **ON ROCKWELL**

CLIP COUPON—MAIL TODAY

Rockwell Manufacturing Company **Dept. 102-H**
Pittsburgh 8, Pa.

Gentlemen:

Please send me bulletin 1044 describing the "120" regulator ☐. Please quote me on_____" regulators. Please have your field representative call ☐.

Your Name_____

Company_____

Street_____

City_____ Zone_____ State_____

For more facts circle 533 on Reply Card

Note the cleanliness as bag is loaded. The dust-laden air is drawn into the hood, thence through the duct to the filter. Cleaned air is returned to the plant.

Note, also, equal cleanliness in dumping. Hoods and ducts are expertly engineered to handle all the dust.

when you load or unload bags

USE SLY DUST FILTERS

This is the Sly Dust Filter located outside the plant of the Haviland Products Company, Grand Rapids, Michigan. It handles 7,000 cfm.

and you will be free from the *annoyance* and *hazard* and *expense* of dust.

Such is the experience — a typical one — of the Haviland Products Co. Note how clean and dust-free bag loading and unloading now are.

Aggravated about dust — the trouble and expense it caused — management over a year ago installed Sly Dust Filters. Results: the company executives are highly pleased with the better working conditions, clean plant and substantial savings realized.

Since 1874, Sly has pioneered and developed positive dust collection equipment . . . the original patentee of the cloth type filter more than 50 years ago.

No matter what you make or process — if there's dust, you need Sly.

Designers and Manufacturers of Dust Control Systems—Blast Cleaning Equipment — Tumbling Mills — Industrial Ovens.

THE W. W. SLY MANUFACTURING CO.

SINCE 1874

4600 TRAIN AVENUE • CLEVELAND 1, OHIO

New York • Chicago • Philadelphia • Rochester • Detroit
Buffalo • Cincinnati • St. Louis • Minneapolis • Houston
Atlanta • Birmingham • Denver • Los Angeles • Toronto

For more facts circle 534 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

sprayed directly on to the reinforced concrete building. It is impervious to mildew, acids, solvents and alkalis, and is fire resistant.

The plastic forms a finish requiring from three to four maintenance

Plastic provides weatherproof, fire-resistant finish for a concrete building

treatments during the life span of the building. Maintenance consists of renewing the finish by spraying on another layer of plastic. *From DeVilbiss News, published by the DeVilbiss Company, Toledo, Ohio.*

Slow-Speed Sawing and Saving

BY SLOWING the speed of friction sawing, several economic advantages are to be gained, according to tests made in our plant. Various gages of stainless steel, mild steel and titanium were cut on band saws with toothless blades at speeds from 200 sfpm to 15,500 sfpm.

Conventional, toothed saws will cut each of these metals at a faster rate than the toothless saws, but in many instances this is not an advantage since there is a limit to the speed at which the operator can follow the scribe lines on the metal.

In the region below 8500 sfpm, minimum speed at which sawing could be accomplished was 2600 sfpm, while the ideal speed was found to be 4500 sfpm. Toothless blade sawing at these velocities presented two advantages over higher speed ranges: reduced burr and lower costs.

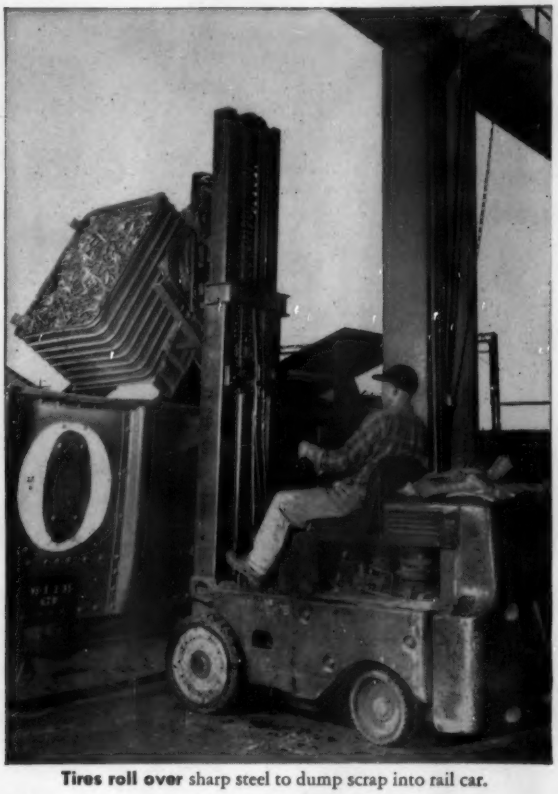
Considerably less burr is produced at low speeds than is experienced

B.F.Goodrich

Industrial tires used 100% by bearing factory to keep production rolling

Trucks equipped with BFG tires deliver wire to Cold Heading Dept.

1600-lb. load of outer races leaves the Hand Screw and Press Dept.



Tires roll over sharp steel to dump scrap into rail car.

THE Bower Roller Bearing Company manufactures all types of bearings at its Detroit, Michigan, factory. 25 to 30 materials handling units operate in nearly every department, hauling raw materials, finished products and scrap. And all this equipment rolls on B. F. Goodrich industrial tires.

Why? Because, says Plant Superintendent A. F. Madison, B. F. Goodrich industrial tires do a better job of combating iron and steel scrap, oily floors and other tire hazards. Thanks to the B. F. Goodrich Tire and Wheel Analysis Plan, Bower equipment rolls on the right kind of tire—and that means the company gets longer tire life, saves money.

How you can save money on industrial tires

Call your B. F. Goodrich Tire and Wheel Analysis man. He'll study your materials handling equipment, loads, hauling surfaces and any special problems you have. Then he'll recommend the right tires for you to use—the right size, tread design and tread compound. The recommendations he makes are unbiased, because B. F. Goodrich makes a *complete* line of industrial tires.

And this TW Analysis *costs you nothing*. Put your equipment on the right kind of rubber. It will save you money. BFG consulting service is also available to materials handling equipment manufacturers.

Specify B. F. Goodrich tires when ordering new equipment

RESEARCH KEEPS B.F.Goodrich FIRST IN RUBBER

The B. F. Goodrich Company
Tire & Equipment Division
Department TW-519, Akron 18, Ohio

Please send me additional information on your Tire and Wheel Analysis Plan

Name_____

Company_____

Street_____

City_____ Zone____ State_____

For more facts circle 535 on Reply Card

GROUND LEVEL SERVICING OF

OVERHEAD LIGHTS

WITH

THOMPSON Servisafe BRACKET UNITS

HERE'S THE ANSWER TO LIGHTING MAINTENANCE PROBLEMS . . . for luminaires mounted on walls or wood poles. "Servisafe" Units permit fast, safe, low-cost servicing . . . assure all-weather accessibility . . . reduce luminaire maintenance to a simple hazard-free one-man job.

SUPPLIED IN COMPLETE PACKAGES* . . . ready for wiring and erecting . . . "Servisafe" Units feature a patented disconnecting and lowering mechanism that permits workman to lower a luminaire . . . clean or relamp it . . . and then reposition it with minimum effort and complete safety.

FOR NEW INSTALLATIONS OR RAPID CONVERSION OF EXISTING FACILITIES, "Servisafe" Bracket Units have unlimited application . . . can be used with all standard pendant and flood type lighting fixtures.

Ground-level luminaire servicing is . . .

- SAFER
- FASTER
- MORE ECONOMICAL

Luminaires are not included in Bracket Unit packages.

WRITE FOR BULLETIN WPH-54 FOR ADDITIONAL DETAILS.

THE THOMPSON ELECTRIC CO.

1165 Power Avenue • Cleveland 14, Ohio

For more facts circle 536 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

Stainless steel stamping is cut out at 4500 sfpm with toothless blade

when sawing within the 8500 to 15,500 sfpm range. Burr begins to decrease at 6500 sfpm or slower, with a minimum at 4500 sfpm, and increases above 8500 sfpm. Lower speeds permit the use of smaller, less expensive band saws, thus reducing the investment in equipment.

Blades used in our tests were shopmade from box strapping and clock spring materials and used in both large and small band saws.

Shopmade toothless saws, also provide longer life, and greater safety and help reduce costs. Toothless blading lasts up to 10 times as long as conventional saws due to the extended fatigue life possessed by the alloys used. Greater longevity of sawblades means fewer work stoppages and less downtime, and cost of individual blades is considerably less than that of conventional blades. *From a release of Ryan Aeronautical Company, San Diego, Calif.*

Preventing Wind Damage

ACCORDING to a report, 15 per cent of windstorm losses involve major structural damage. Losses resulting from damage to roof coverings, eaves, flashings, etc., and frequently, subsequent water damage to the contents of the buildings, amount to 85 per cent.

Building damage is not necessarily caused by winds of hurricane force, for frequently-occurring winds of lesser force can affect vulnerable or exposed features. Time spent in examination of the following items is usually brief and where trouble is detected early, repairs are not extensive.

Building and miscellaneous structures such as signs, should usually be

TYPE F
STEELFLEX
COUPLING

- Any Size
- Any Service
- Any Application, Horizontal or Vertical
- Always available

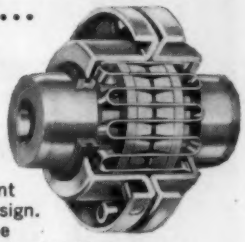
The exclusive grid-groove design of FALK Steelflex Couplings protects your machinery in two ways

You get double protection when you connect your driving and driven machinery with a Falk Steelflex Coupling—the all-steel-built coupling with the exclusive grid-groove design! First, its torsional resilience smothers shock and vibration; and second, the Steelflex design prevents damage and lowered efficiency by accommodating shaft misalignment.

Why have increasing numbers of key men in industry standardized on Falk Steelflex Couplings? Their experience has proved that Falk Steelflex Couplings prolong the service life of their machinery...are trouble-free and need minimum maintenance...are easy to install, lubricate and disconnect ...and cost less per year of service than ordinary couplings.

One basic Steelflex design—the Type F, in its many sizes—is adaptable to more than 90% of all industrial applications. This facilitates buying, as well as prompt replacing and servicing when necessary. Write to Department 247 for engineering bulletin, including selection and dimension details.

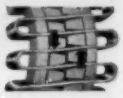
How shock and vibration are smothered by the FALK Steelflex Coupling's Torsional Resilience...



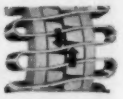
This cutaway view shows the sturdy all-steel construction, also the exclusive, torsionally resilient grid-groove design. Here is how the grid-groove design functions:

UNDER LIGHT LOADS The gridmember bears only at outer edges of grooves. The long span between points of contact remains free to flex under load variations.

UNDER NORMAL LOADS As load increases, the distance between supports on grooves is shortened proportionately, but a free span remains to cushion shock loads.

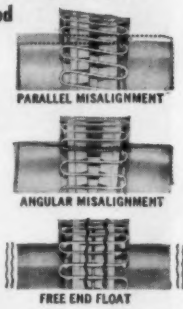


UNDER SHOCK LOADS Under extreme overloads, the gridmember bears fully on the grooves and transmits full load directly. The coupling remains flexible, within its rated capacity.

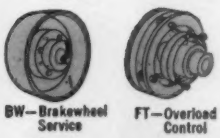


SHAFT MISALIGNMENT ACCOMMODATED
Free End Float Permitted

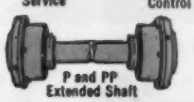
Controlled flexibility in the FALK Steelflex coupling provides compensation for parallel and angular shaft misalignment—and permits free end float for the shafts of the driving and driven members, or of either one.



Rapid CM—Reversing Service | H and HH High Speeds | FS—Limited Space



BW—Brakewheel Service | FT—Overload Control



P and PP Extended Shaft

OTHER TYPES AVAILABLE

In addition to the standard Type F (which meets more than 90% of all applications), special or dual purpose Steelflex designs are available for unusual applications. A few of the many types are shown here.

THE FALK CORPORATION, Milwaukee 8, Wisconsin

MANUFACTURERS OF

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

FALK

...a good name in industry

For more facts circle 537 on Reply Card

FOR FUME AND DUST REMOVAL

SPIRATUBE®

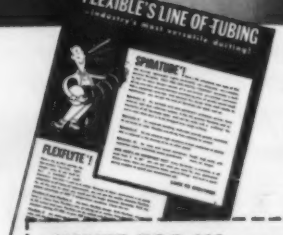
gets closer-in!

For blowing, exhausting, and light materials handling, Spiratube is proving itself *superior to costlier types of ducting*... because it bends at any point, takes tight turns up to 180°, and needs no special fittings for snaking around obstructions.

Made of galvanized steel wire helix which is secured in place between overlapping plies of various specially coated fabrics, this new, lightweight, flexible ducting connects quickly and easily to permanent or portable lines.

Standard sizes for all requirements are immediately available from well-stocked distributors—coast-to-coast.

SPIRATUBE is used by Todd Shipyards Corporation for removing welding fumes during ship construction and repair at its two plants in New York Harbor.



Flexible Tubing CORPORATION

Guilford, Connecticut Los Angeles 64, California

WRITE TODAY for details on Flexible's full line of amazing cost-saving ducting.

For more facts circle 538 on Reply Card

PLANT ENGINEERS' DIGEST

(Digest begins on page 36)

designed to resist the force of 100 mph winds.

Lifting action, as a consequence of upward deflection of the wind as it strikes a wall, produces a suction over a flat roof, tearing away an inadequately bonded or cemented covering. Wind, entering under the covering at worn or insecurely fastened edges or flashings, or at loose edges of roofing sheets, may also tear off large areas of covering.

Other features commonly affected are coping tiles, dislodged when the mortar holding them deteriorates and loosens; roof ventilators and exhaust ducts which depend on guy wires for support; and roof signs and dust collectors held by anchor bolts which may have worked loose.

Metal stacks are susceptible to corrosion, and failure during windstorms may occur where the steel has rusted under the band to which the guy wires are attached, or at joints of upper sections where gases condense. Stacks should be inspected every two years. *From Sentinel, published by Factory Insurance Association, Hartford, Conn.*

Tracking Sound

A MICROPHONE and an oscilloscope are being used in our General Engineering Laboratory to trace the direc-

Oscilloscope tracks noise produced by motor operating in anti-echo chamber

tion of sound and to measure the total sound output of a motor.

The tests are conducted in an anti-echo chamber, the spun glass interior of which eliminates reflected sounds and makes possible measurement of direct sound produced by the equipment under test. *From a release of General Electric Company, Schenectady, N. Y.*

American Blower Horizontal Unit Heaters offer you

Separate coils for steam or hot water

American Blower Venturafin Horizontal Unit Heaters — Capacities: 18,000 to 357,500 BTU at 2 lbs. steam pressure, 60° entering air.

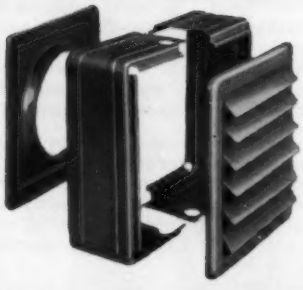
At no extra cost you can choose *either steam or hot-water coils* when you select American Blower Venturafin Horizontal heaters for your jobs.

Both coils have high-quality non-ferrous fins, mechanically bonded to seamless copper tubes—which, in turn, are brazed to headers.

Hot-water coils have two-row serpentine construction, resulting in greater heating capacities at lower water volumes. One- or two-row steam coils are available.

For data, consult your nearest American Blower Branch Office, today.

American Blower offers a wide selection of Vertical Unit Heaters. Capacities: 58,400 to 560,000 BTU at 2 lbs. steam pressure, 60° entering air.



Sturdy, durable casing

Heater casings are phosphatized to prevent rust and finished in attractive baked enamel. Hardware is cadmium plated. Complete casing is strong, durable, easy to clean.

Other American Blower Unit Heaters

American Blower's gas-fired unit heaters and de luxe cabinet heaters for commercial and industrial use are compact, efficient and easy to install.

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO
Division of American Radiator & Standard Sanitary Corporation

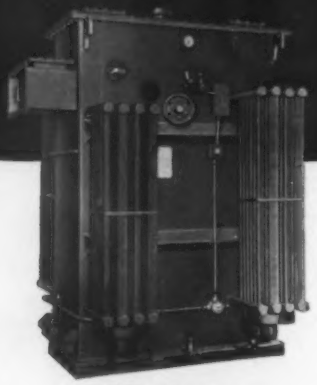
AMERICAN BLOWER

Serving home and industry: AMERICAN-STANDARD • AMERICAN BLOWER • CHURCH SEATS & WALL TILE
DETROIT CONTROLS • KEWANEE BOILERS • ROSS EXCHANGERS • SUNBEAM AIR CONDITIONERS

For more facts circle 539 on Reply Card

Wagner®
TRANSFORMERS
...the choice of leaders in industry

for space-saving load centers... specify Wagner Close-Coupled Unit Substation Transformers



Wagner

THROAT-CONNECTED UNIT SUBSTATION TRANSFORMERS

For outdoor installation, or for applications where it is desirable to locate the transformer away from the switchgear, Wagner can furnish these liquid-filled transformers in ratings to 2000 kva, 15 kv and below. Bulletin TU-13 gives full information.

Now, Wagner liquid-filled unit substation transformers are available in new, improved close-coupled units, rated from 300 to 2000 kva, that can be flush-mounted with any make of switchgear. They can be used in both single and double-ended unit substations to form neat, compact, streamlined substations for modern industrial service.

Bushings are provided on the ends of the close-coupled transformer for connection to the switchgear. The bushing heights are designed for a minimum distance from the base, giving ample room to make connection to switchgear or busses in the switchgear compartment or transition section.

In this type design it is not necessary to coordinate bushing height of transformer and switchgear as in the throat connected units which often require special throat heights to match special switchgear. This feature means that a standard transformer can be used for special switchgear application with a minimum of engineering coordination, resulting in shorter deliveries.

Look to Wagner for better transformers that assure a continuous, dependable flow of power. Your nearby Wagner engineer will be glad to help you solve your load-center problems. Call the nearest of our 32 branch offices, or write us.

Wagner Electric Corporation
EST. 1891

WAGNER ELECTRIC CORPORATION
6492 PLYMOUTH AVE., ST. LOUIS 14, MO., U.S.A.

BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

ELECTRIC MOTORS
TRANSFORMERS
INDUSTRIAL BRAKES
AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

T33-2

For more facts circle 540 on Reply Card

it's **boiler check-up** time!

HOW ARE YOUR BLOW-OFF VALVES?

Are they drop-tight? Rugged and dependable? Easy to maintain?

Just as important, do they have all the advantages and up-to-date improvements in materials and design of new YARWAY Blow-Off Valves?

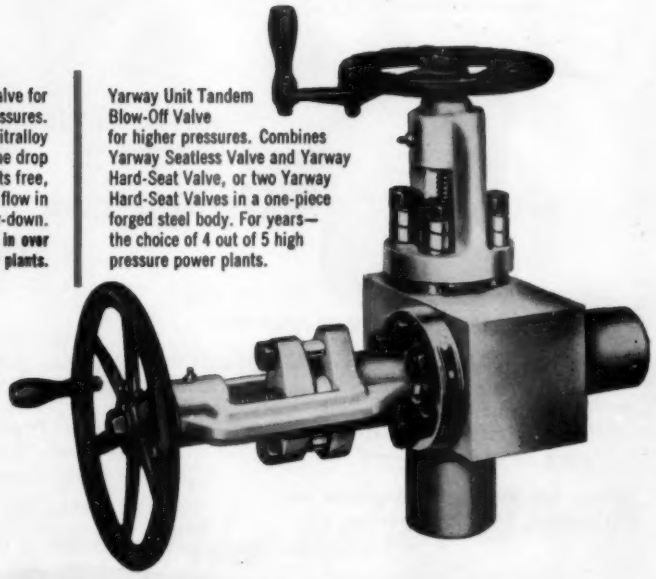
Old YARWAY Blow-Off Valves also can be overhauled and modernized, because all YARWAY improvements are *interchangeable* with parts on earlier models.

Write today for free YARWAY Blow-Off Valve CHECK SHEET—also new YARWAY Blow-Off Valve Catalog B-426 (pressures to 400 psi) or B-434 (pressures to 2500 psi).

YARNALL-WARING COMPANY
145 Mermaid Avenue, Philadelphia 18, Pa.
BRANCH OFFICES IN PRINCIPAL CITIES

Yarway Seatless valve for low and medium pressures. Features balanced nitralloy plunger that seals line drop tight—yet permits free, unobstructed flow in blow-down. **Used in over 15,000 boiler plants.**

Yarway Unit Tandem Blow-Off Valve for higher pressures. Combines Yarway Seatless Valve and Yarway Hard-Seat Valve, or two Yarway Hard-Seat Valves in a one-piece forged steel body. For years—the choice of 4 out of 5 high pressure power plants.

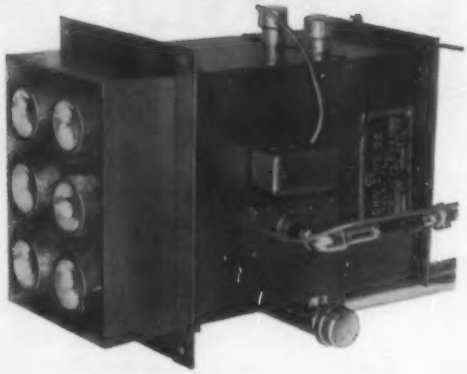


YARWAY blow-off valves

For more facts circle 541 on Reply Card

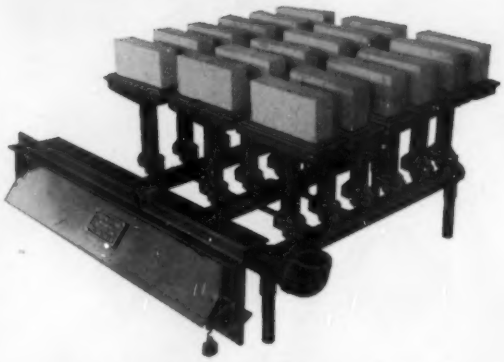
JZ JOHN ZINK

POWER and HEATING BURNERS



SERIES STV GAS BURNER

Ideal for heating boiler installations, to convert from coal or oil to natural gas; and for firing Scotch Marine boilers. From one to fifty heads. Supplied as a complete packaged unit. Quiet, efficient and economical to operate.



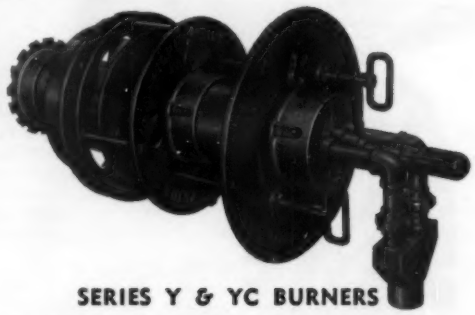
SERIES VR VERTICAL GAS BURNER

The VR Burners are especially designed to operate in boilers having low draft and small combustion space. "Upshot" radiant type with multiple burner heads. Capacities from 4" to 4 oz.

SERIES "R" BI-AIR BURNER

For all types and sizes Heating Boilers and small Power Boilers. Short flame gas burner with multi-jet burners. Has refractory semi-venturi mixing throats. Capacities to meet your requirements — 4" to 1#.

Write for illustrated bulletin on John Zink equipment.



SERIES Y & YC BURNERS

Combination gas and oil burners designed for boilers and furnaces where maximum heat release at low excess air and high heat density place a premium on reliable burner performance. Has extremely high turn-down ratio. Low first cost.

All John Zink Burners are protected by U. S. Letters of Patent

JOHN ZINK COMPANY

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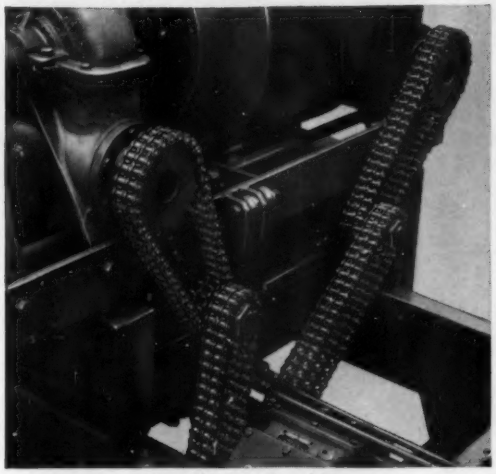
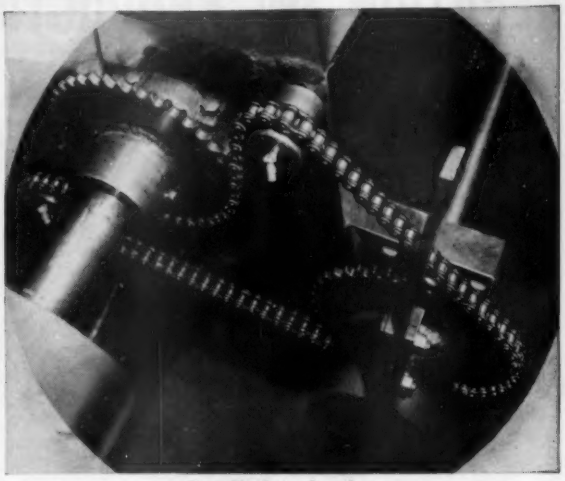
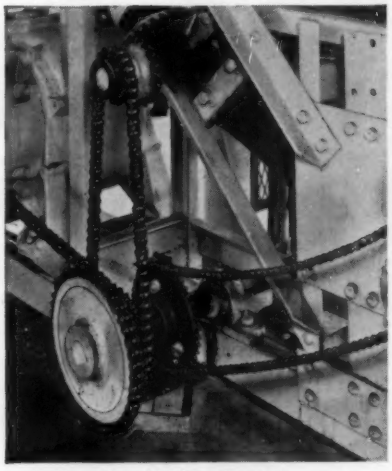


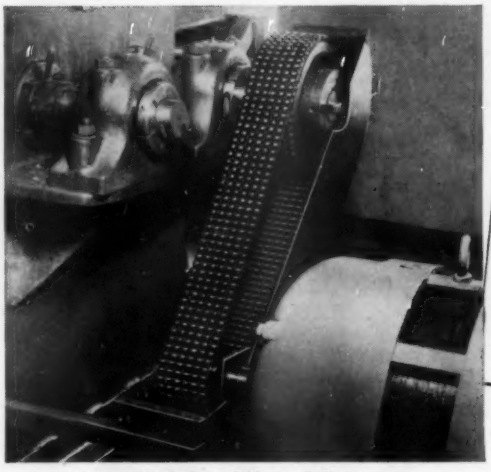
One Shaft to Another
Both Revolve Same Direction



One Shaft to Another
Shafts Operate in Opposite Directions



One Shaft to Several



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ALWAYS PRELOADED

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Not only flexible in application, but economical as well, Diamond Roller Chains maintain constant speed ratio and high (98-99%) efficiency.

Drive requirements can be met quickly because of the greatly increased range of STOCK Chains and Sprockets now available.

Whether the drive center distances are short or long; speeds high, low, or medium; Diamond Roller Chains will do the job. And power transfer, in large or small amounts, presents no problem. New Catalog 754 covering *stock* Chains and Sprockets will help you to correct selection.

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Heat Transfer Units Replace Steam Coils in Tanks

WHEN THE circular pipe coil used to heat asphalt in a 50,000-gallon storage tank at The Ruberoid Company plant in Millis, Massachusetts, developed a leak early in 1953, the tank was put back in operation in one-third of the time and at one-half the cost that would have been involved in putting in new pipe coil. The installation savings were credited to a newer type of heat transfer unit, known as Platecoils, that was employed.

The Platecoils, made by Tranter Manufacturing, Inc., consist of two embossed sheets of metal, welded together to provide channels for passage of heating or cooling media.

At the Millis plant, the ends of the old pipe coil were plugged and it was left in the tank. Four Platecoils, each 22 in. wide and 83 in. long, were installed in the tank above the old coil. Each is separately fed with 120-lb steam and is trapped individually.

Since the Platecoils could be installed without extensive cleaning of semi-hard asphalt from the tank, their use eliminated draining the tank.

Plant Engineer J. A. McEdwards reports that with the four Platecoils piped in and trapped separately, one unit can become inoperative without affecting the others. If any of the attached pipe or the Platecoil fails, the other three can be used. Formerly, if a pipe coil failed, the entire coil had to be replaced. Now, if one fails, repairs can be delayed until such time as business is slack, in the winter.

Platecoils were originally used at the Millis plant in a 10,000 gallon cutback asphalt storage tank. The cutback asphalt is maintained at a certain temperature required for its use in the manufacture of asphalt paints, cements and waterproofing compounds.

Here again, the old pipe coil in the tank failed. The tank could not be emptied to replace the coil without stopping production in this particular department, so a Platecoil was dropped through the manhole in the top of the tank and reconnected to steam lines with the proper regulating device.

Plastic Cuts Costs in Motors

GLASS FIBER-REINFORCED polyester sheet is reported to reduce by 25 per cent the direct material cost of cutout switch plates used by the Century

(Continued on page 54)

Limit Switches Provide Basic Controls for Conveyor System Watchguards

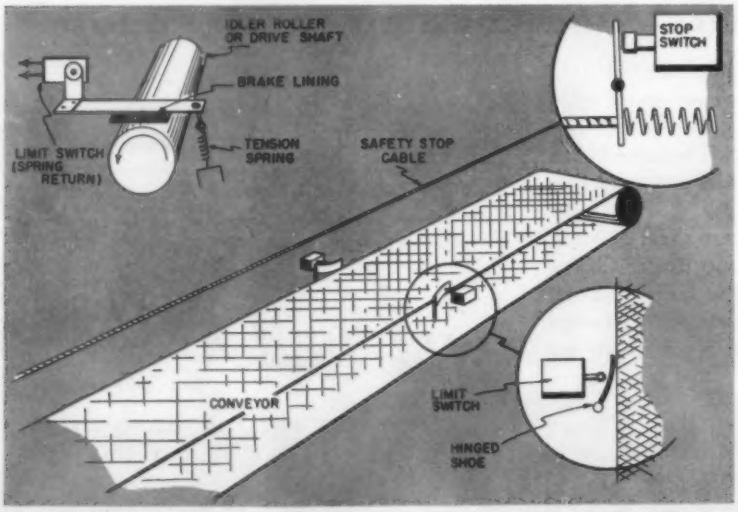
Contributed by Howard T. Bailey, Brillion Iron Works

BELT CONVEYORS are great time-savers, particularly in a foundry, but there are maintenance problems that must be overcome before they are fully effective.

A major source of trouble on the belts is their tendency to creep over to one side of the roller frame, and gradually wear away on a brace or similar obstruction.

One way to remedy this situation is to install limit switches on each side of the belt. The switches are activated by oversize shoes, mounted immediately adjacent to the belt, on vertical pivots. As the belt moves to one side or the other, it forces one of the shoes against a limit switch, which breaks the motor starter holding circuit.

The limit switches are normally closed switches, wired in series. The two leads are connected in series with the common terminal of the start-stop push button.



Composite drawing of devices for conveyor system built around limit switches

To restore operation after realigning the belt, the operator holds down the start button until the belt clears the limit switch, and the motor starter holding circuit will automatically hold itself in.

Another trouble common to conveyor belts and elevators is belt slippage. In many cases, the belt stops completely, with the motor and drive pulley continuing to run. A simple and effective method of preventing this occurrence involves another limit switch application. In this case, a friction pad keeps the switch closed, as long as the conveyor rollers are turning. When the belt stops for any reason, the friction pad is retracted by a spring, allowing the contacts in the switch to open. The circuit to the drive motor is thus broken, and the entire drive stops.

To provide an emergency stop operable from any spot along the conveyor, a cable can be strung along the conveyor and connected to a spring-loaded arm. The arm is mounted so that a pull on the cable will move it against a limit switch, providing an immediate cut-off of power to the motor driving the conveyor.

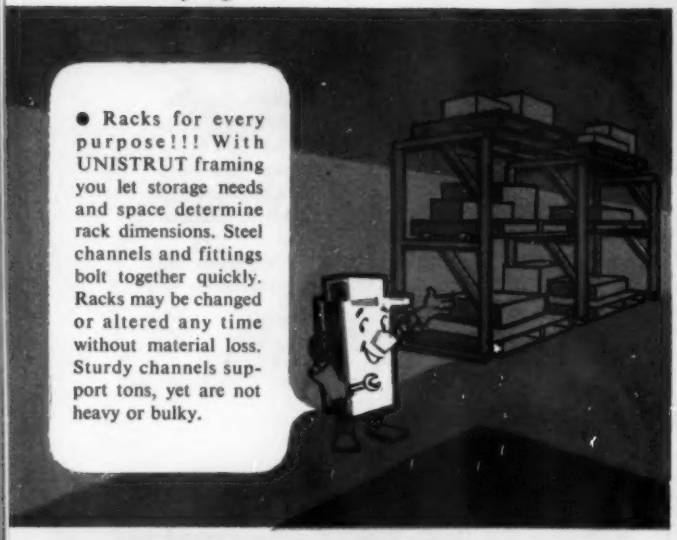
To be completely effective in controlling the conveyor system, all motor starters of the entire system must be electrically interlocked so that if one unit fails, all units preceding the out-of-service unit will stop immediately.

For more facts circle 544 on Reply Card

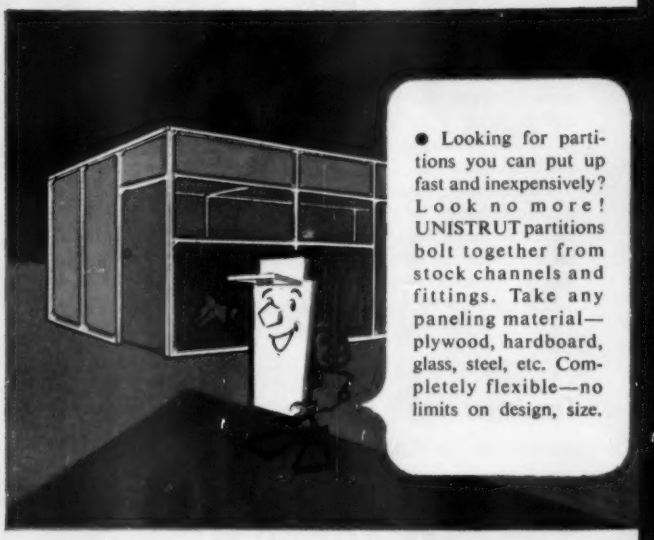
"The Sky's The Limit"

—when you build with UNISTRUT®

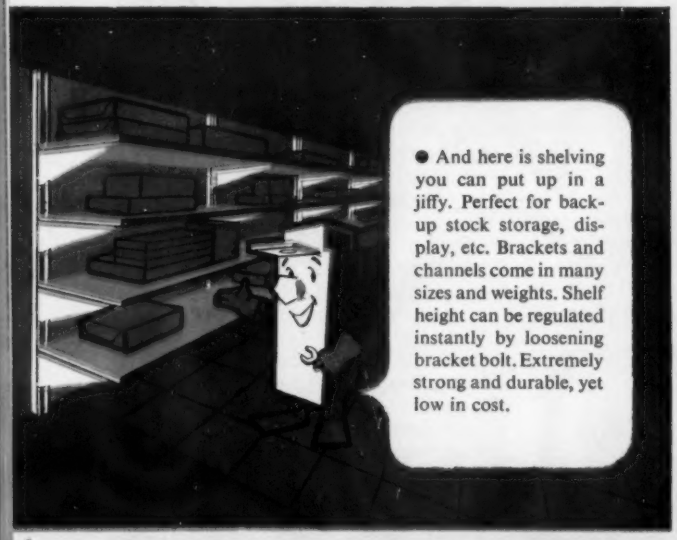
Mr. Strut shows how UNISTRUT® framing and imagination build almost anything



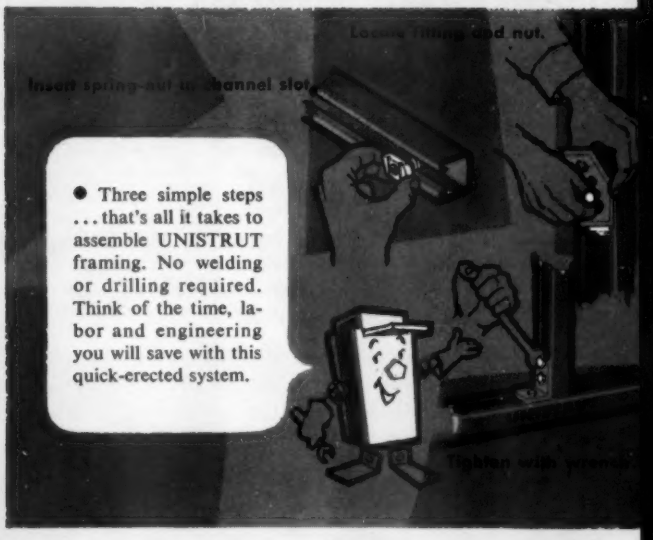
● Racks for every purpose!!! With UNISTRUT framing you let storage needs and space determine rack dimensions. Steel channels and fittings bolt together quickly. Racks may be changed or altered any time without material loss. Sturdy channels support tons, yet are not heavy or bulky.



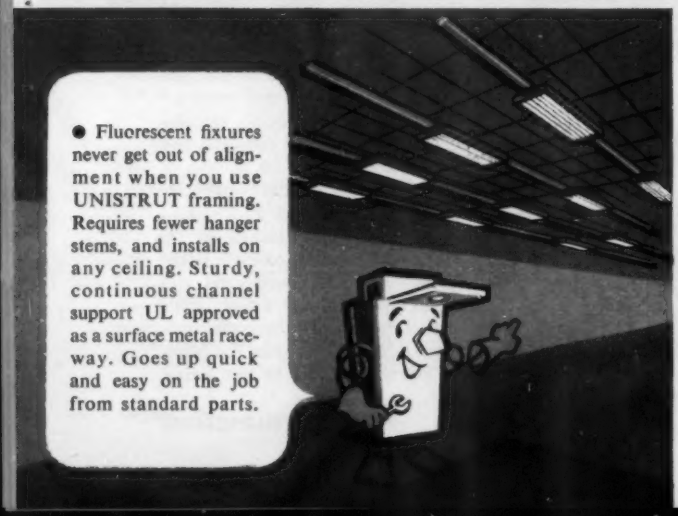
● Looking for partitions you can put up fast and inexpensively? Look no more! UNISTRUT partitions bolt together from stock channels and fittings. Take any paneling material—plywood, hardboard, glass, steel, etc. Completely flexible—no limits on design, size.



● And here is shelving you can put up in a jiffy. Perfect for back-up stock storage, display, etc. Brackets and channels come in many sizes and weights. Shelf height can be regulated instantly by loosening bracket bolt. Extremely strong and durable, yet low in cost.



● Three simple steps ... that's all it takes to assemble UNISTRUT framing. No welding or drilling required. Think of the time, labor and engineering you will save with this quick-erected system.



● Fluorescent fixtures never get out of alignment when you use UNISTRUT framing. Requires fewer hanger stems, and installs on any ceiling. Sturdy, continuous channel support UL approved as a surface metal raceway. Goes up quick and easy on the job from standard parts.

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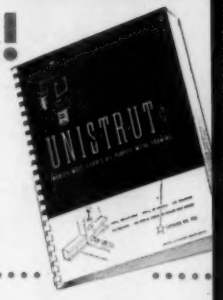

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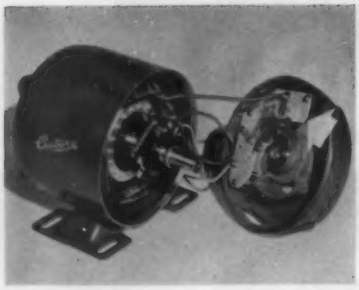
OPERATION—PRODUCTION

(O and P begins on page 52)

Electric Company, St. Louis, Mo., in its small single-phase induction motors. The mounting plate thickness has been reduced from the ⅛ in. formerly required with a canvas-phenolic sheet, to 3/16 in., resulting in the 25 per cent material savings.

Lower basic cost of the sheet, made by the Glastic Corp., affords an additional savings over the phenolic, even on a volume corrected basis, according to the manufacturer.

The mounting plate, designed for



Removal of end bell from small motor shows location of plastic plate (arrow)

use interchangeably in the various sizes of motors in the single-phase group, requires a number of terminal connections and mounting variations. The 15 holes involved require an intricate punching, with some of the holes located very close to the edge of the piece. Cold punching these holes has eliminated the preheat cycle and reduced the scrap losses formerly experienced when the piece had to be hot punched.

Polythene Conveyed Without Contamination

MEETING the necessary requirements for contamination-free conveying of polythene in cube form, a Dracco Airstream system has been placed in operation at Canadian Industries (1954) Ltd. plant in Edmonton, Alberta.

Polythene is affected adversely by any or all forms of contamination—a

(Continued on page 56)

Foundation Nuts Replace Bolts in Concrete Floors, Make Machinery Moving Easier

Contributed by F. E. Riley

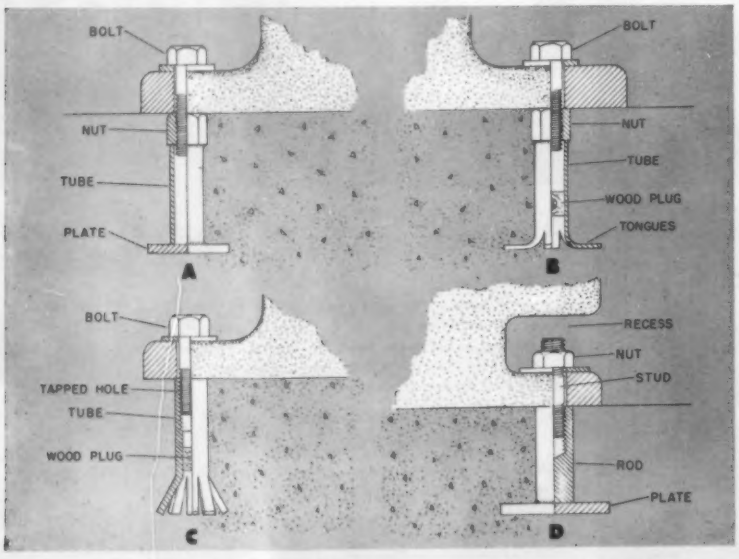
IN ANCHORING MACHINES to a concrete floor, it is common practice to use foundation bolts, the threaded ends of which protrude from floor surface.

Movement of a machine leaves the foundation bolts protruding from the floor and they must be sawed or burned off flush with the surface.

To avoid this destruction of old foundation bolts, sink the nuts into the floor instead of the bolts. The nut surface is flush with the floor and a machine that has been moved leaves nothing on the floor except the tapped holes in which the bolts fitted.

Using foundation nuts when installing machines, there is no necessity for setting the bolt projection above the floor level to very precise limits, to insure that insufficient bolt thread has been allowed above the floor to accommodate the required nuts and washers. Once set in place, the foundation bolt offers no latitude for raising the machine feet clear of the floor for the fitting of anti-vibration mountings and the like. With foundation nuts, merely fitting a longer bolt will accommodate the increased height.

Some forms of foundation nut which can be made up simply by welding are shown in the drawing. Figure A shows a part section through a foundation nut which comprises a standard hexagon or square nut welded to a length of steel tubing, with a flat steel plate welded at the other end.



Four types of foundation nuts practical for securing machinery to concrete floors

When installing foundation nuts of this type, a rough hole is chipped to the required depth in the existing floor. The nut can be suspended at the correct position in the hole by laying a strip of wood to form a bridge and suspending the nut by means of a bolt passing down through a hole in the strip and engaging with the nut.

Foundation nut 'B' also uses a stock nut welded to a length of steel pipe. To form an extended anchoring surface, the lower end of the pipe is splayed outward by splitting with a hacksaw and bending over the tongues thus formed. To prevent the concrete from running up the tube interior and blocking the nut, a rough wooden plug is driven into the tube bore.

An effective foundation nut which requires no welding and which can be installed in a small diameter hole drilled in the concrete is illustrated by 'C.' Here again, tongues are splayed outward to suit the hole size drilled in the floor. The actual nut portion is a thread tapped in the tube bore. This nut is useful and economical where tubes having bores suitable for the root diameters of standard bolt threads are available.

An alternative to the internally threaded pipe is a steel rod tapped out at one end, as illustrated in 'D.' This presents another value of the foundation nut—a screwed stud can be used in preference to a bolt. This is particularly useful where the machine foundation has a recess for housing the foundation bolt or nut heads.

how to PICK UP 2,900,000 BTU without "wiggling" the flame

One of a number of batteries of roof-top fans which exhaust vented air from 10 identical systems.

solved by a KIRK & BLUM ventilation system!

Above—Battery of RCA Sealex machines. Heat from glass sealing and evacuating operations on electron tubes is collected by aluminum hoods and duct-work.

At right—Radio Tube Stem & Bulb Tubulator machines. Heat from glass working operations is picked up and vented. Replacement air is furnished by Kirk & Blum systems.

Heat can be a headache in any plant. Here, in a midwestern tube plant of RCA Victor Division, Radio Corporation of America, glass sealing and forming operations require plenty of heat of all kinds—induced, radiated and reflected. For the comfort and safety of workers, this heat must be removed but without disturbing the play of gas flames on delicate parts.

KIRK & BLUM engineers achieved a fine balance, removing 2,900,000 BTU hourly and without distorting the delicate flames.

Whatever your ventilation problem... heat, dust or fumes... the best, lowest-cost solution involves more than a fan, motor and some lengths of duct. Put it up to experts...**The Kirk & Blum Mfg. Co., 3189 Forrer Ave., Cincinnati 9, Ohio.**

KIRK & BLUM

VENTILATION SYSTEMS

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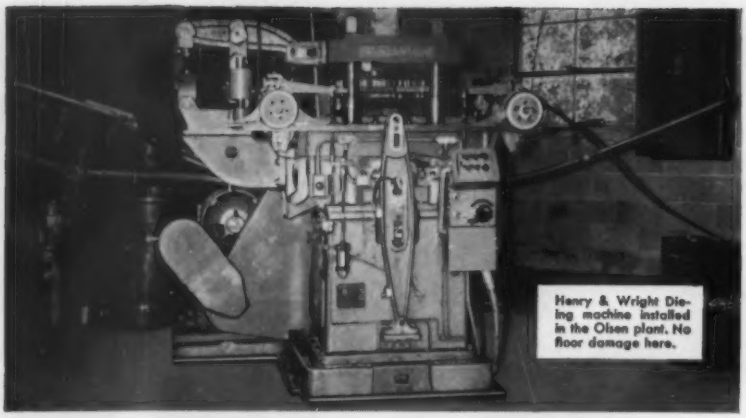

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Last year I learned about UNISORB and was interested since I did not want to damage the floors. I tried UNISORB under a couple of machines. The results were startling. My machines were held in place without bolts or lag screws—transmitted vibrations were almost eliminated and I was able to speed up production. All of this plus labor-saving on installation costs. I tried UNISORB under many machines with the same results—wonderful! I am completely sold on UNISORB and I recommend it highly.

Very truly yours,
OLSEN MACHINE & TOOL CO., INC.
Arnt Olsen
ARNT OLSEN
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OPERATION—PRODUCTION

(O & P begins on page 52)

fact that was of prime consideration in deciding upon a suitable means for conveying the material from the plant to storage prior to packaging and shipment.

The Dracco system is said to have th following advantages:

(1) It is completely enclosed—no hands touch the material. (2) The material is conveyed with a stream of

Fig. 1. Start of the air conveying system. Carrier lines are at operator's left

Fig. 2. Two aluminum pipe lines carry air-entrained material to warehouse

air filtered before use, eliminating all possibility of contamination from atmospheric dust. (3) There is no metal-to-metal contact in the conveyor—hence no contamination from metal filings. (4) It is self-cleaning—requires no periodic shut-down for manual cleaning.

Polythene is produced at the plant in strips four to five inches in width and subsequently cut into tiny cubes, in which form it is packaged and delivered to the user. Airstream conveys

You can pull these plugs at full load . . . SAFELY!

Circuit-Breaking Arktite

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20 amp. to 400 amp.—250V D.C.; 600V A.C.

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NEW, Re-Designed *Arktite*...

Features new pressure connectors — new easier-to-wire 1-piece interior assemblies — new easier-to-interchange plug and receptacle interiors — new plug adaptability to any type and size cable.

Fully interchangeable with older style. Same price. Currently available only in 30 amp. size, in 2-, 3- and 4-poles.

● Operated like a giant switchboard, this *Arktite* installation with variations in power, frequencies and voltages is used to speed up machine tool testing. Plugs can be inserted and withdrawn from "live" receptacles without using a disconnect switch.

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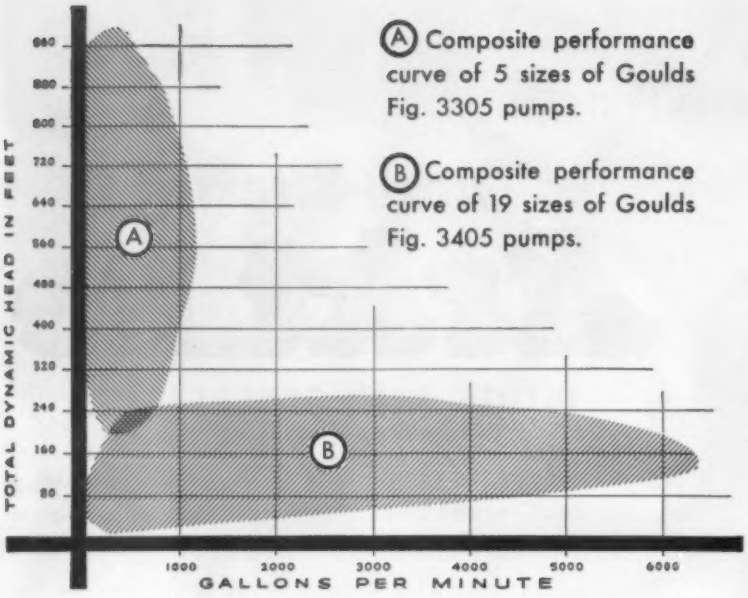
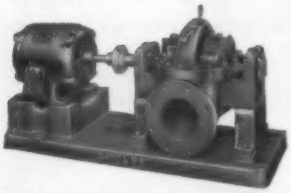


Ⓐ Composite performance curve of 5 sizes of Goulds Fig. 3305 pumps.

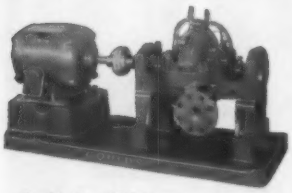
Ⓑ Composite performance curve of 19 sizes of Goulds Fig. 3405 pumps.

Do you need **pumping capacity?**

. . . or head? . . . or both?



Goulds Fig. 3405 single-stage pump.



Goulds Fig. 3305 two-stage pump.

With these two groups of Goulds centrifugal pumps you can meet an extremely wide range of pumping requirements.

For volume pumping, 19 sizes of the Fig. 3405 single-stage, double-suction pump provide capacities up to 6,400 GPM, and heads to 280 ft.

For greater pressure requirements 5 sizes of the Fig. 3305 two-stage pump provide heads up to 1,000 ft., and capacities to 1,200 GPM.

Both of these groups of pumps have important new design and construction features that insure efficient operation and long life. Yet, because so many of their parts are interchangeable, *you can cut your parts inventory in two—or better.*

For example, you need only 3 different shafts for all 24 sizes of pumps in both groups.

We'd like to send you additional details about these pumps, including specifications and performance curves. Just write for Bulletin 721.6 about the Fig. 3405 single-stage pumps, and Bulletin 722.6 about the Fig. 3305 two-stage pumps. We'll be glad to send you copies of both.

MEMBER HYDRAULIC INSTITUTE U.S.A.

Goulds PUMPS INC. Seneca Falls New York

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For more facts circle 548 on Reply Card

OPERATION—PRODUCTION

(O and P begins on page 52)

these cubes from the plant through two aluminum pipes at a rate of three tons per hour to four large silos 200 ft away. When needed for packaging, the material is removed from the base of the silos, placed in large bags and loaded into boxcars for delivery.

Transparent Photocopy Papers Cut Duplicating Costs

Contributed by James F. Selvidio

EXTENSIVE USE of transparent photocopy papers to lighten the work load on our photostat machine and cut the cost of duplicate prints, at the U. S. Navy Underwater Sound Laboratory, New London, Conn. The procedures have cut down the operation of the photostat machine to two days a week, where previously there was always a large backlog of copying work.

Whenever we have a request for three or more copies of any original, we copy the original directly on the transparent paper. Originals up to 11 in. by 17 in. are copied in the photocopy camera; larger originals up to 18 in. by 24 in. are copied in the photostat machine. The resulting transparent negative photocopy is used as a master to run off as many copies as may be required on a dry-printing machine, using diazo-process paper. These copies cost only 1/7 as much as copies made on photostat paper. They also reduce the consumption of developing and fixing chemicals, and require no washing, drying, or trimming.

High-speed projection photocopy paper, made by Peerless Photo Products, Inc., and which is coated on a lightweight 55 gram extra-thin 003 translucent stock, gives very satisfactory results when used for this purpose. It is supplied in rolls which are spooled to fit the magazine of the photostat camera. In addition, the paper does not have a tendency to curl excessively, and is easier to write on when making changes or additions.

Approximately 90 per cent of our orders for photocopies call for negative copies, that is, a reverse of the original, with white lines on a black background. Using the transparent negative as a master to run the copies on diazo-process paper gives us these negative copies. When positive copies are requested, that is, with black lines on a white background, identical to the original, we make a photostat negative first, and then a transparent posi-

ALCOA ALUMINUM INDUSTRIAL SHEET "IN GOOD CONDITION" AFTER 23 YEARS OF SEVERE SERVICE

Over twenty years at hard labor, and still going strong! That's a recent report on Alcoa® Aluminum Curved Corrugated Sheet by The Philadelphia & Reading Coal & Iron Company.

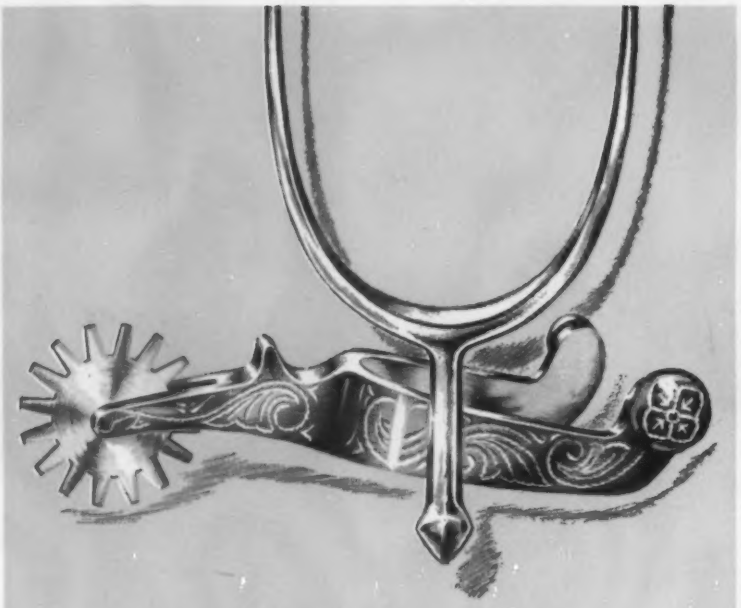
Alcoa Aluminum was installed as the conveyer covering of their St. Nicholas Central Breaker located in Schuylkill County, Pa., in 1932. Exposed to rigorous weather and corrosion conditions since then, it is still in good condition.

Alcoa Aluminum was specified by Stone & Webster Engineering Corporation, the builders, because of previous unsatisfactory experience with other materials. Slightly higher in first cost, the lighter weight of aluminum made it easier to handle, less expensive to erect. And the savings on maintenance and replacement proved it the most economical buy by far.

Alcoa Aluminum Curved Corrugated Sheet is just one of the many modern building materials developed by Alcoa. For complete information on these construction cost cutters, call your local Alcoa sales office. Or write for your copy of our A. I. A. file on Alcoa Aluminum Industrial Building Materials. Aluminum Company of America, 861-H Alcoa Building, Pittsburgh 19, Pa.

Your Guide to Aluminum Value

For more facts circle 549 on Reply Card



Choose one . . .

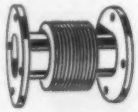
You can see at once that these spurs differ; serve different need. Suppliers differ. Titeflex was born and raised on a custom-engineering way of doing business. Fresh thinking comes naturally to them. Titeflex people like to tackle the tough ones.

When you buy any Titeflex product you get something extra for your money—Titeflex interest in you. Take time to learn the difference. Send the coupon along today.

Titeflex

☐ Seamed and Seamless Metal Hose

☐ Ignition Harness and Shielding



☐ Precision Bellows

☐ Quick-Seal Coupling

TITEFLEX, INC.
Industrial Products Division, 536 Hendee Street, Springfield, Mass.

Please send me without cost information about the Titeflex products checked above.

Name_____

Title_____

Firm_____

Address_____

City_____ Zone_____ State_____

Left—Western spur with 16-point rowel Right—English spur with straight rowel

For more facts circle 550 on Reply Card

OPERATION—PRODUCTION

(O & P begins on page 52)

tive copy of this, which is used as the master to run off the positive copies on the dry-printer.

Another advantage of this procedure is its flexibility and speed, particularly when a re-order for additional prints arises. When the conventional photostat process is used, the negative copy of the original on photostat paper is the only working copy available, and it cannot be used for rapid production of copies in quantity. When more copies are needed, either the original or the photostat negative copy must be located again and recopied. But when transparent paper negatives are made, the originator keeps these in his file, and when additional copies are needed, he merely selects the proper transparent master and has the necessary number of additional copies run off on the dry-printing machine.

In many cases, an enlarged copy of the original is desired for ease of reading. Enlargements can be made from the transparent photocopy paper with no greater effort than making size-for-size copies.

In other cases, large drawings and schematic diagrams that are too large or cumbersome to bind readily into technical reports at full sizes can be reduced to the desired size when the transparent negative is made on the photostat machine, and the resulting negative can then be run same-size on the dry-printing machine.

We use this procedure not only for reproducing line-work but also for making multiple copies of continuous-tone originals. For the latter, we expose a photographic negative of the original and a sheet of the transparent paper by contact printing through a magenta half-tone screen. This gives us a positive transparent master which can be used for making additional positive copies quickly on the Ozalid or any other dry-printing machine.

Traveling Billboards Sell Quality

MORE THAN 30 transportation vehicles are serving as traveling billboards at Goodyear Aircraft Corporation. As the result of a newly-instituted program, eye-arresting placards with slogans stressing quality workmanship are being carried through company plants daily.

The placards, which are 11 in. by 14 in. in size, are mounted on either side of the trucks, most frequently on the engine hoods. The slogans, printed

Quality control placard slips readily into bracket mounted on platform truck

or written in script, are large enough to be easily read as the vehicles move about.

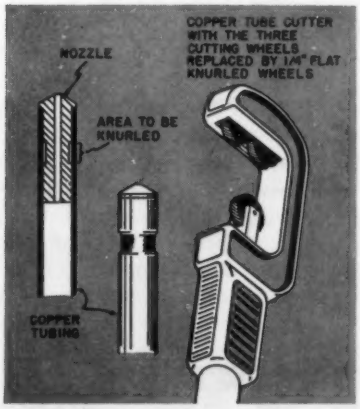
More than 25 different slogans are being carried by GAC's intraplant trucks. New messages will be added at intervals, and the company has invited employees to participate by submitting slogans.

Nozzles Crimped Into Tubing

Contributed by George Fink, Allis-Chalmers Manufacturing Co.

A COPPER TUBING CUTTER has been converted into a crimping tool at Allis-Chalmers, for use in fastening nozzles into coolant mist spray tubes. The nozzles were formerly secured in the tubes by tinning or soldering.

The cutting wheels of the tube cutter have been replaced with ¼ in. knurled wheels. After the nozzle is inserted into the end of a tube, the crimper is rolled around the tube at the point where the nozzle body is grooved, and the application of pressure crimps the copper tube into the groove. The nozzle is securely held in place with no further sealing or fastening on the tube exterior.

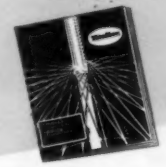

NOZZLE
COPPER TUBE CUTTER WITH THE THREE CUTTING WHEELS REPLACED BY 1/4" FLAT KNURLED WHEELS
AREA TO BE KNURLED
COPPER TUBING

Drawing shows tool adaptation for crimping, cross section of nozzle insert before crimping, and completed job

...to handle vibration, temperature and corrosion headaches in conveying applications

Do you have to conduct water, solutions, fuel, lubricants, oxygen or other gases or liquids between two points which may not remain fixed? Your answer is Titeflex flexible metal hose.

Titeflex offers you just about everything you could wish for in metal hose—seamed or seamless, braided or unbraided, a wide choice of alloys and fittings. And Titeflex has the originality and experience to simplify your design difficulties—the laboratory control and development engineering assistance you want behind you. All you have to do is send your drawing; we fill in the exact hose type required. ***Telephone or mail in the coupon for full information about metal hose and its uses, catalog #200.***



Titeflex

FLEXIBLE METAL HOSE

TITEFLEX, INC.
Industrial Products Division
536 Hendee Street
Springfield, Mass.

Your knowledge of metal hose applications may be helpful to us. Please send your complete catalog—without obligation.

Name_____

Title_____

Firm_____

Address_____

City_____ **Zone**_____ **State**_____

For more facts circle 551 on Reply Card

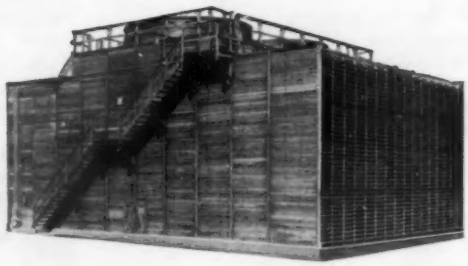
NOW

is the time to TEST Your Tower!

IF a water cooling tower has been installed in your plant in the past year, now is the time to find out whether the tower you own is the one you specified and paid for. This is the ideal time for a PERFORMANCE TEST. Your tower now should be operating at peak efficiency with all elements well coordinated. Of greater importance, ***this is the season when actual operating conditions most closely parallel conditions specified in your purchase contract.***

During summer months tower tests may be conducted at or near specified wet bulb temperatures, which means fewer variables, fewer calculations . . . it means the most accurate tests possible to obtain.

Since analysis of the results of a series of carefully conducted tests is the only method



of arriving at proof of the performance your tower is delivering, the manufacturer will be glad to assist in verifying the integrity of his product. He will welcome the opportunity to provide the necessary technical assistance that will enable you to conduct conclusive tests.

If you are not one of the 5000 engineers, operators and owners who requested copies of "Test Your Tower," the Marley brochure that explains a simple direct method of testing cooling towers, write for a copy today.

MARLEY

The Marley Company

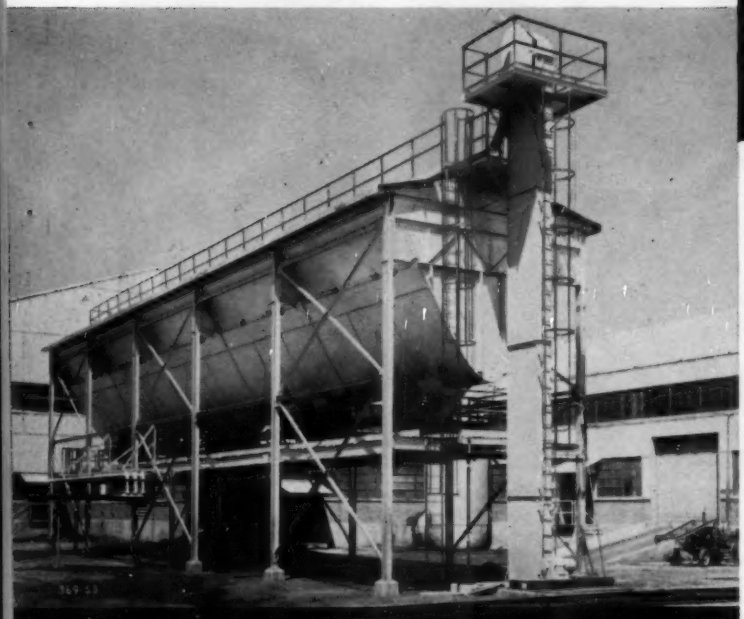
Founder Member Cooling Tower Institute 222 West Gregory Blvd. Kansas City, Missouri

For more facts circle 552 on Reply Card

For more facts circle 553 on Reply Card ⟶

JEFFREY GETS COAL TO WORK ON TIME!

Electrical power is generated at this plant. A Jeffrey belt conveyor performs the important job of bringing coal from storage piles to coal bunkers.



Fiberboard products are this company's business. A Jeffrey bucket elevator, lifting coal to storage, is an important step in this manufacturing process.

Hotel hospitality on a grand scale goes on while in the basement a Jeffrey pivoted bucket carrier forms complete run-around system handling coal or ashes.

At a busy manufacturing operation . . . in an important electric generating plant . . . beneath one of the largest hotels in the world — Jeffrey handling equipment gets coal to work on time and keeps it coming.

Jam-ups in coal inflow or ash removal close down power plants pronto, whether they need a few tons, or several thousand tons per hour. Machinery stops, lights go out, guests grumble.

That's why Jeffrey talks first of dependability. Place your confidence in Jeffrey to keep coal rolling without a halt — efficiently, economically.

No matter what handling unit or system you need, chances are Jeffrey has engineered, built and installed one just like it. Jeffrey's vast experience is backed by the highest standards of design, materials and workmanship.

If your coal comes to work late, loafs on the job, suffers from bad handling on obsolete equipment — better see Jeffrey! We'll be glad to send you Catalog 778-A describing complete power plant equipment — weigh larries, vibrating, apron and plate feeders; crushers; trippers; spiral and scraper conveyors; drag chains; skip hoists; car pullers; bin accessories, etc.

Write for Catalog 778-A.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

sales offices and distributors in principal cities

PLANTS IN CANADA, ENGLAND, SOUTH AFRICA

IF IT'S MINED, PROCESSED OR MOVED

. . .IT'S A JOB FOR JEFFREY!

Day-Brite CFI (Comfort For Industry) lighting provides comfortable lighting levels on all work surfaces by taking full advantage of wall and ceiling reflectances. Electric Controller & Manufacturing Co., Cleveland, Ohio.

Better seeing, better production with new Day-Brite **CFI** *lighting*

When you put "comfort" lighting to work for you, benefits are immediate and continuous—particularly if you install new Day-Brite CFI (*Comfort For Industry*) lighting.

By washing out brightness contrasts *at the ceiling*—as illustrated in the Day-Brite CFI-10 installation above—worker eye comfort is greatly improved. Nervous and muscular tensions and fatigue are reduced; morale and efficiency are boosted. Speedier and more accurate control of many work operations results; over-all higher standards of production are achieved.

There are two Day-Brite CFI units available —the CFI-10 and CFI-25. They provide 10% and 25% upward lighting, respectively. Updraft ventilation promotes cool operation and minimizes dust deposits on fixture bodies.

SEE, EXAMINE and COMPARE Day-Brite with any other lighting. Look at the fixtures—not just the pictures!

CALL YOUR DAY-BRITE REPRESENTATIVE! You'll find his industry-lighting experience valuable.

5467

Day-Brite Lighting, Inc.

5439 Bulwer Ave.

St. Louis 7, Missouri

NATION'S LARGEST MANUFACTURER OF COMMERCIAL AND INDUSTRIAL LIGHTING EQUIPMENT

For more facts circle 554 on Reply Card

HALL LABORATORIES, INC.—A SUBSIDIARY OF HAGAN CORPORATION, PITTSBURGH, PENNSYLVANIA

Hall Industrial Water Report

VOLUME 3 AUGUST 1955 NUMBER 4

It Takes a Lot of Water Conditioning To Operate a Steel Mill at Capacity Plus

The constantly increasing production of steel demands a constantly increasing stream of raw materials. Water, used in many ways, is one of the most important. More than 100 tons of water go into the production of every ton of steel, underlining the importance of water engineering to the steel industry. Hall Laboratories, through close cooperation with plant personnel, serves the steel industry, whether in routine control of daily treatment, or in solving the many special problems peculiar to the steel industry.

The Skid-Pipes Were Skidding

Difficulties with cooling water constitute the bulk of steel plant water problems. For example, in one steel plant, the water cooled skid-pipes on which billets are pushed through 2000°F reheating furnaces were buckling.

Investigation revealed that scale formation cut down heat transfer and caused the overheated pipes to fail. Threshold Treatment of the cooling water with Calgon® now keeps the skid-pipes free of scale, and the buckling of the pipes is no longer a problem.

Discoloration of Galvanized Strip Checked

Hall engineer B. Q. Welder reports on solution of a problem in the galvanizing mill of a large steel mill in the "Iron City."

"Galvanized strip unaccountably developed large dark discolorations some weeks after shipment. It seemed to me that the source of the discoloration might be in the rinsing operation.

"Following galvanizing, the strip was rinsed by immersion in and spraying with filtered river water. The last step in the process was a chromate-silicate rinse prepared with clarified river water. Carryout of solids from the rinses was responsible for the trouble.

"Since adopting our recommendation that condensate be used for the rinse following the immersion tank and in making up the final chromate-silicate rinse there have been no further reports of trouble."

Baffling Problem Solved

When the exchange capacity of a sodium zeolite softener in an eastern steel mill dropped to 8.2 kilograins per cubic foot from a rated capacity of 16 kilograins per cubic foot, plant personnel consulted their Hall engineer, D. E. Noll. To confirm his suspicion that hydraulic channeling of the resin bed was responsible for the loss of capacity, Noll tried an intermediate backwash to redistribute the resin. The backwash doubled the length of the run, indicating that channeling might be the trouble.

When operation permitted an inspection of the resin bed, Noll and the plant men found that although fissures had not broken through, high flow rates around the edges of the unit had pushed down the exchange material, and a cone had formed in the bed.

To step up the efficiency of the softeners, Noll suggested a baffle design that would insure even distribution of the incoming water throughout the exchange bed. When the units were returned to service with baffles installed, the exchange capacity came up to the rated 16 kilograins per cubic foot and normal regeneration practice was resumed.

Specialists in iron and steel metallurgy are skilled at transforming crude ore into finished metal. Like the technologists in steel, Hall Laboratories fits the treatment of a vital raw material, water, to the need in specific processes in the manufacture of steel.

New Control System Tested

A new system of automatic blowdown control developed by Hall Laboratories' research has shown in field trials that it maintains boiler water solids concentration within plus or minus 5% of the set point.

The equipment continuously determines the dissolved solids concentration in boiler water by measuring the conductivity of a flowing sample. A signal from the conductivity cell pneumatically controls the blowdown valve.

The new control system minimizes the possibility of carryover and allows close control of treatment under all conditions.

Booklet H-1, describing the Hagan Automatic Blowdown Control System, is available upon request.

Industrial Water Problems Require Special Handling

There are no "stock answers" to industrial water problems. For information, write, wire or call Hall Laboratories, Inc., Hagan Building, Pittsburgh 30, Pa.

Water is your industry's most important raw material. Use it wisely.

Heard about Fenwal's two new snap-action THERMOSWITCH® units?

1. FOR LOCAL CONTROL. Series 20,000, local bulb type, is an important advance over conventional bellows-actuated temperature controls. Bellows arrangement in the liquid-filled bulb permits sensitivity over virtually the entire area of the shell, greatly reducing lag. Temperature range: 50° to 300°F. Load rating: 20 amps at 120V AC.

2. FOR REMOTE CONTROL. Series 511, remote bulb type, includes a long capillary tube connecting the probe at the point of temperature change. Like the Series 20,000, it provides the advantages of maximum sensitivity and instant actuation of the snap-switch. Temperature ranges: 60° to 250°F, or 200° to 550°F. Load ratings: 25 amps at 250V AC; 35 amps at 125V AC.

3. FENWAL DEPENDABILITY IN BOTH. These bellows-type snap-action THERMOSWITCH units are typical products of Fenwal research, featuring sensitivity, stability and quick, positive action. Precision-built for uniformity, ruggedness and dependability, they are valuable additions to the expertly engineered, widely useful THERMOSWITCH line.

4. SEND FOR DATA BULLETINS. Get complete facts on the new Fenwal snap-action THERMOSWITCH devices, now. We'll be glad to send you comprehensive bulletins on either or both types, or to discuss any problem involving temperature control or detection. **Write Fenwal Incorporated, 358 Pleasant St., Ashland, Mass.**

Fenwal

THERMOSWITCH®

Electric Temperature Control and Detection Devices

SENSITIVE...but only to heat

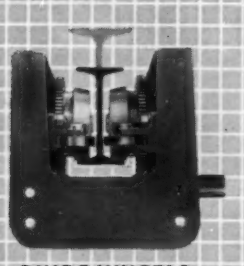
For more facts circle 556 on Reply Card

For more facts circle 557 on Reply Card ⟶

ACCO products

These Simple Steps Show You How to Save Money on Cranes

B-516 END TRUCKS



GUIDE WHEELS

When you are confronted by a material handling problem, and the decision is to **BUY** overhead equipment, either monorail or cranes may be the solution. **WRIGHT** offers a wide variety of quality hoists, some being hand and others **ELECTRIC**. For production purposes hand hoists are now being replaced by **HOISTS** powered by electricity. For the very latest design see the B-516 **END TRUCKS**. Flangeless wheels permit travel on various beam sizes, **AND** thrust rollers, bearing against the eye beam webs prevent skewing. **CRANE DRIVES** are equipped with a new design of solenoid "drag" brake and are furnished in a wide variety of travel speeds. To save freight charges . . . **BUILD** cranes locally with WRIGHT'S soundly engineered crane components. **MODERN** construction and manufacture call for Timken Tapered Bearings in **MOTOR DRIVEN** trucks and either single speed fluid drive or variable speed **CRANES**.

We will be glad to send you literature carrying full information on any or all of the following WRIGHT Crane components:

Hand Traveling Cranes—top running single bridge Bulletin #DH-468
" " " —underhung Bulletin #DH-348A
Motor Driven Cranes—underhung single bridge Bulletin #227
" " " —top running Bulletins #DH-448 or #DH-449

WRITE OUR YORK, PA., OFFICE

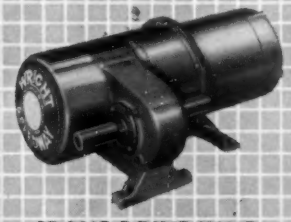
ACCO

Wright Hoist Division
AMERICAN CHAIN & CABLE

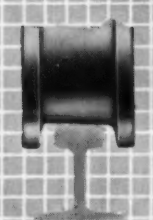
York, Pa., Atlanta, Chicago, Denver, Detroit, Los Angeles, New York, Philadelphia, Pittsburgh, San Francisco, Bridgeport, Conn.

for Better Value

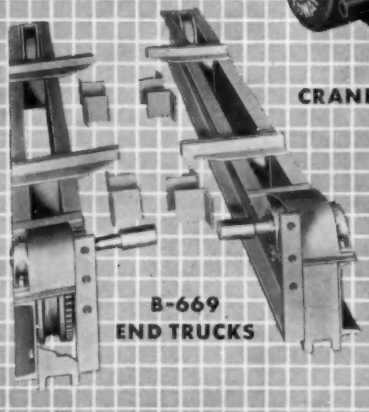
B-514 END TRUCKS



CRANE DRIVE UNIT

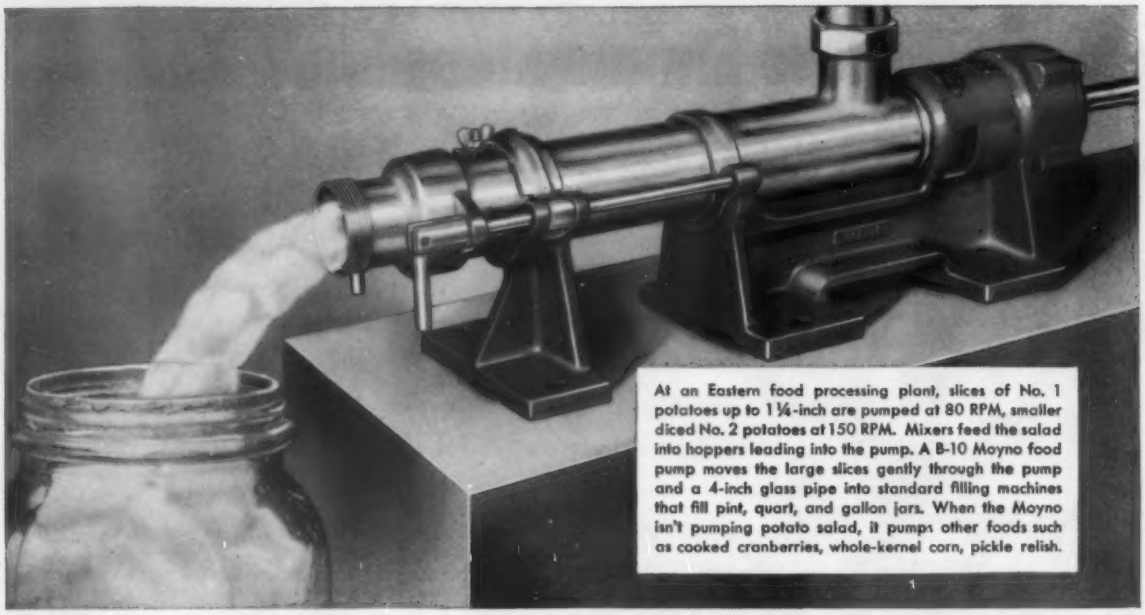


END VIEW



B-669 END TRUCKS

TWH DOUBLEBEAM TROLLEY HOIST



At an Eastern food processing plant, slices of No. 1 potatoes up to 1¼-inch are pumped at 80 RPM, smaller diced No. 2 potatoes at 150 RPM. Mixers feed the salad into hoppers leading into the pump. A B-10 Moyno food pump moves the large slices gently through the pump and a 4-inch glass pipe into standard filling machines that fill pint, quart, and gallon jars. When the Moyno isn't pumping potato salad, it pumps other foods such as cooked cranberries, whole-kernel corn, pickle relish.

This Moyno® Pumps Potato Salad With Slices Up To 1¼-inch...Without Crushing!

The Moyno can pump potato salad and a lot of other materials without making mush out of them—because of the unique *progressing cavity* principle.

Moynos have no valves and pistons, no vanes or other devices that cause churning and turbulence. The Moyno has a simple screw-like rotor turning within a double-threaded stator. This design creates cavities which progress smoothly toward the discharge end of the pump, carrying the material being handled. The material is not squeezed or churned.

Pumps Practically Anything

That's why the Moyno successfully handles such hard-to-pump materials as non-pourable pastes, frits, plaster, highly volatile liquids, and materials containing large particles, such as potato salad, fruit, cherries, chow mein—even oysters! In fact, the Moyno handles practically anything that will pass through a pipe.

Many Other Advantages

Moynos pump many hard-to-pump materials with a minimum of abrasion and wear. Many plants have adopted Moynos simply because they last so long.

Moynos provide positive displacement. Moynos can pull up to 29 inches vacuum while discharging under pressure. Big Moynos deliver up to 500 gpm; can provide pressures up to 600 psi in the smaller frame sizes. They even get up to 1000 psi momentarily.

The Moyno is reversible—it pumps equally efficiently in either direction.

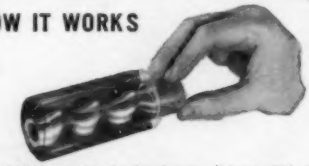
With the Moyno, accurately metered flows are obtainable by regulating operating speed.

Moynos are trouble-free. They are self priming; won't cavitate or vaporlock. There's just one moving part—no valves to stick, no pistons to gum up. Built for tough service. Easy to maintain. Moyno pumps are easy to take apart for cleaning.

Write For Bulletin

You may save a good deal of money or solve a tough problem by finding out about this simple, versatile pump. Write for Bulletin 30PE.

HOW IT WORKS



Rotor is like a stretched-out corkscrew. It turns within a stator that has a double internal thread. Thus rotor and stator form closely fitted cavities. As the rotor turns, these cavities progress evenly toward the discharge end of the pump without closing up. That's why the Moyno easily handles materials without crushing, churning, or aerating; and why it can handle so many different things—solids in suspension, pastes, abrasives, highly volatile liquids, tars, soaps, caustics—even cement and plaster.

FOR DESIGN ENGINEERS

Moynos are available in small sizes and special designs for use in automatic washers, drink dispensers, sprayers, oil burners, machine tools, gasoline pumps, and a wide variety of other equipment. If you are designing machinery, we'll work with you, in confidence, to integrate pump design with your problem.

ROBBINS & MYERS, INC.

SPRINGFIELD, OHIO • BRANTFORD, ONTARIO

R&M •

Fractional and Integral HP Motors

Desk, Window, and Household Fans

Hoists and Cranes

Moyno Pumps

Propellair Industrial Ventilating Equipment

For more facts circle 558 on Reply Card

BEFORE YOU BUY A PACKAGE BOILER

CHECK THIS LIST!

If you need a package boiler, the list at the right can give you some interesting answers. Of course, C-E's Type VP Boiler rates a "yes" answer to every question. It offers also many other operational advantages, such as simple, effective soot blowing; high heat absorption; low draft loss, no dead gas pockets and simple baffle arrangements.

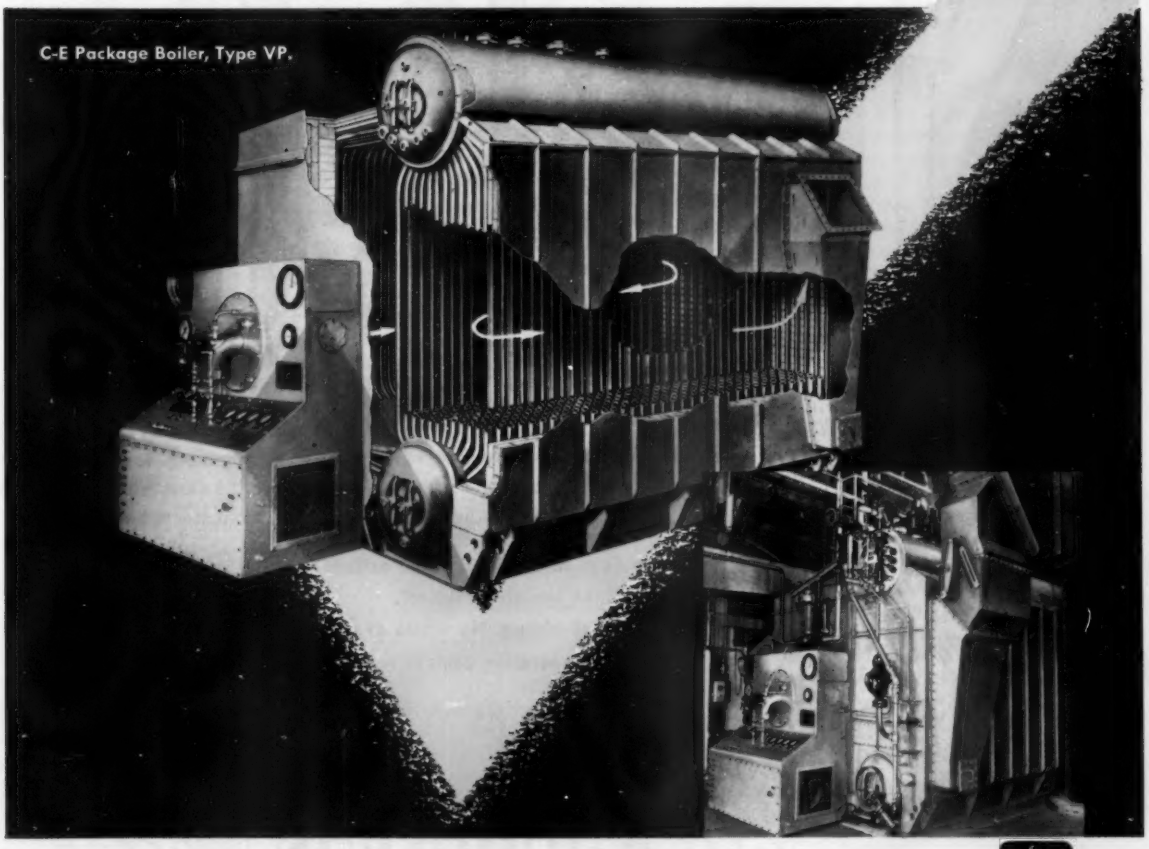
That's why VP purchasers range from small companies to some of the nation's largest – plus schools, institutions, government agencies, including the Atomic Energy Commission. These users employ VP Boilers for all types of applications – heating, process, even power generation.

SPECIFICATIONS OF THE VP BOILER

Capacity — 4,000 to 40,000 pounds of steam per hour
Pressures — up to 500 pounds per square inch
Fuel — oil or gas
Erection — completely shop-assembled
Foundation — simple concrete slab

Have full details on the VP next time you are in the market for a boiler of moderate capacity. Get the new Catalog VP-128, which contains specifications, and information on dimensions, construction details and controls. B-845A

	BOILER A		B		C	
	Yes	No	Yes	No	Yes	No
Will your boiler be a real "package" type with control panel and all controls mounted integral with the boiler?						
Will your package boiler be equipped with drum internals to assure dry steam?						
Will its "steam quality" be backed with a guarantee?						
Will your boiler have a 30-in. lower drum to provide convenient accessibility?						
Will yours be a one-burner boiler, with a simple wiring and control system?						
Will your boiler have the largest load swing range available?						
Will your boiler be equipped with a quiet centrifugal fan?						
Will your furnace be completely water-cooled?						
Will your furnace have the highest ratio of water cooled surface to furnace volume?						



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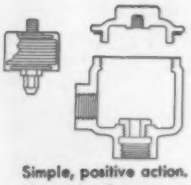

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CONSTRUCTION BRIEFS — a review of fundamentals for the plant engineer

Prepared by Byron A. Engelbach, Plant Engineer

COLUMNS

THERE ARE PROBABLY as many formulas, differing in constants, used for determining safe allowable loads for steel columns as there are for wooden column calculations. Most generally used are those which have been found to give safe results consistently and are found in the large city building codes. They may differ, but are basically the same and produce almost identical end results.

The following formula is typical:

$$\frac{P}{A} = 16{,}000 - 70 \cdot \frac{1}{r}$$

Where P is to represent the safe load that the column will carry, A is the area of the cross section, 1 represents the length in inches, and r the least radius of gyration.

The building codes or standard specifications will limit P/A, the developed fiber stress, to a definite value, and the designer should consult the local building code for the area in which the application will occur.

The radius of gyration of any cross section of any beam or column, that is, any structural member is found by dividing the moment of inertia I of the cross section by the area A, then extracting the square root of the quotient.

Reduced to formula,

$$r = \sqrt{\frac{I}{A}}$$

Example 1.

Refer to Fig. 1. A rectangular structural member is shown 6 in. by 8 in. in cross section.

Problem: Find the least radius of gyration for this member.

Solution:

$$\text{Use formula } I = \frac{b\ (h)^3}{12}$$

By substitution,

$$I = \frac{6 \times (8)^3}{12} = 256$$

Area = 6 x 8 = 48 sq in.

therefore

$$r = \sqrt{\frac{256}{48}}$$

= 2.3 in. about axis A-B

Also,

$$I = \frac{8 \times (6)^3}{12} = 144$$

Area = 48 sq in.

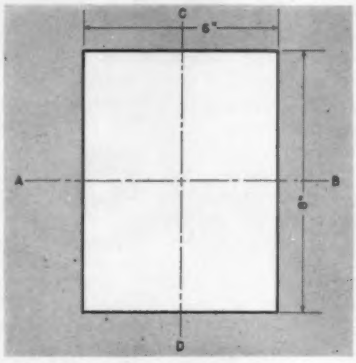

Fig. 1. Cross section of member, with axes drawn to show radius of gyration

therefore

$$r = \sqrt{\frac{144}{48}}$$

= 1.73 in. about axis C-D

A comparison of the two values found for r about different axes indicates that the least radius of gyration is about the axis through the least dimension in cross section.

In columns, the moment of inertia used must be with respect to the axis about which it is the least, for it is around this axis that buckling of the column takes place if the column fails, due to the load. The least I is the one which gives the least radius of gyration, as can be observed from the previous example.

For different cross sections of iron or steel columns, it is unnecessary to work the formula to find the least radius of gyration, since they are already available in Engineering Handbooks.

Also available, in both U. S. Steel's 'Pocket Companion' and the AISC Handbook are tables of 'Allowable Unit Stresses for Compression Members.'

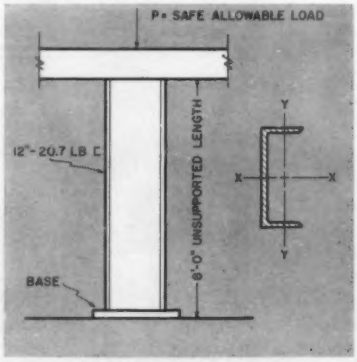

Fig. 2. Structural channel used as a column. Major and minor axes, inset

The AISC Tables are computed from the formula

$$f = \frac{18000}{1 + \frac{(1)^2}{18000(r)^2}}$$

and present values of f, solved for various values of 1/r, as substituted in the formula. An immediate solution for the column formula is thus made available.

Example 2.

A 15 in., 42.9 lb I-Beam is to be used for a 15 ft column.

Problem: Find the safe allowable load.

Solution:

1 = 15 x 12 = 180 in.

From a Steel Handbook in Table of Beam Elements:

r = 1.08

A = 12.49 sq in.

Then 1/r = 180/1.08 = 166.6

Refer to a table giving Compression Unit Stresses for 1/r and find that for 166 the stress equals 7110 and for 167 the stress is 7060. Since the stress desired is between the two stresses given, interpolate to find 7080 as the unit stress to be used in the formula.

Therefore

P = 12.49 x 7080 = 88,429 lb

This total load can be checked by referring to the Pocket Companion which gives values for beam columns, American Standard Sections.

Example 3. Assume an I-Beam used as a column with unsupported length of 15 ft, carrying a load of 70,000 lb.

Problem: Find the size of standard I-beam which will carry the load designated.

Solution: Refer to the same Steel Tables as were used in problem No. 2, and opposite the 15 ft length listing, find the size of steel column that will carry a load equal to or slightly higher than 70,000 lb. This will be a load of 83,000 lb and the member will be a 12 in., 40.8 lb I-Beam.

When a channel is used as a column the safe load is figured by the straight line formula. The steel handbooks provide ample information regarding the elements of such sections.

Example 4. Refer to Fig. 2. This shows a 12 in., 20.7 lb channel used as an 8 ft column.

Problem: Find the safe allowable load the channel will support as a column.

Solution:

l = 8 x 12 = 96 in.

Area (from table of Elements) = 6.03 sq in.

r_{xx} = 4.61 and r_{yy} = 0.81

Therefore least radius of gyration is 0.81

Then l/r = 96/0.81 or 119

Since the ratio is over 100, the designer should use the table presenting Compression Unit Stresses.

f = 10130 for a ratio of 119

Then P = 20.7 x 10130 = 209,691 lb

Example 5. Assume a channel 8 ft long to be used as a column to support 100,000 lb.

Problem: Find the proper channel section to use.

Solution: Since both the area and radius of gyration are unknown, solution is of the substitution type. Refer to the tables and select a channel which might carry the load and substitute the unknown quantities in the straight line formula.

If the slenderness ratio is between 40 and 100, the

$$P/A = 16{,}000 - 70\frac{l}{r}$$

formula may be used. It must be remembered that the fiber stress developed should not exceed the amount stipulated in the code currently in use.

Select a 10 in., 30 lb channel. Then l = 8 x 12 or 96 in., r equals 0.67 and A equals 8.80 sq in. Then l/r = 96/0.67 or 143.

Since the ratio is over 100, use the allowable unit stress table and find that for a ratio of 143, the f value is 8,430 lb. Then P = 8.80 x 8,430 or 74,184 lb. This does not meet the problem requirements.

Try a 12 in., 35 lb channel. Then l = 96 in., r = 0.76, A = 10.26 sq in. and l/r = 96/0.76 or 126. The allowable fiber stress from the tables is 9560 lb. Then P = 10.26 x 9,560 or 98,050 lb which still does not meet the problem requirements.

Try a 12 in., 40 lb channel. Then l = 96 in., r = 0.75, A = 11.73 sq in. and l/r 96/0.75 = 128. The allowable fiber stress is 9420 lb. Then P = 11.73 x 9420 = 110,497 lb. This meets the requirements of the problem with a better than 10 per cent overage and the channel would be safe.

When angle irons are used as compression members in trusses or as columns, the designer must bear in mind that a third radius of gyration enters the picture. Refer to Fig. 3. The least radius of gyration is the one which is used in the straight line formula when solving column problems. Any good handbook will give the elements of angles and it should be noted that in addition to the normal two radii the third element is also given.

In problems of designing columns it is common to build up a steel section with plates and angle irons to arrive at a section capable of carrying tremendous loads. The problems become more complicated, but are solved in basically the same way as when a simple section is used. Built-up sections as columns will be investigated at a later date.

Refer to Fig. 4. There are many types of built up steel column sections and those shown are only a few of the many. As the column section becomes more complex the problem of calculating the safe load becomes more complicated.

Ratio r_x/r_y

The allowable loads for steel columns as found in the AISC and U. S. Steel Handbooks are for various lengths which are unbraced along the minor axis. There may be instances where it is necessary to investigate the carrying capacity of columns with reference to both major and minor axes. The ratio r_x/r_y is included in these tables and provides a rapid and convenient method of investigating the strength of a column with respect to the major axis.

The selection of a column from the tables is based on the greatest unbraced length (l) with reference to the radius of gyration about the minor axis. To obtain the maximum unbraced length with reference to the radius of gyration about the major axis, it is only necessary to multiply the length l by the ratio r_x/r_y. If the actual unbraced length with reference to the major axis is equal to or less than the length thus obtained, the selected section is adequate and by the same token, if the actual unbraced length is greater than the length thus found, the section is inadequate and must be redesigned to fit conditions.

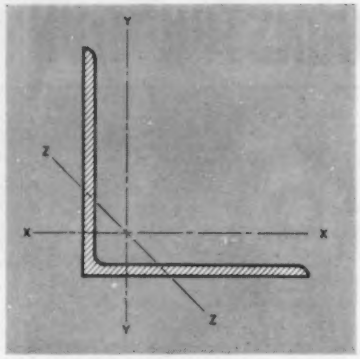

Fig. 3. Angle iron used as compression member has third radius of gyration, z-z

Example 6. Assume that a 10-in. wide flange beam column is required to carry a concentric load of 181,500 lb. The greatest unbraced length along the minor axis is 16 ft and along the major axis, 30 ft.

Problem: Size the column correctly.

Solution: Entering the tables for 10-in. wide flange beams used as columns, find that at 16 ft a 10-in. member weighing 45 lb per foot will carry an allowable load of 166,000 lb or 166 kips. This section will carry 181,500 lb at 13.75 ft. The ratio r_x/r_y is 2.17. The maximum length at which the column may be unbraced along the major axis is 13.75 x 2.17 or 29.8 ft. This section is inadequate, on both major and minor axis loadings.

The next heavier section is a 10 in., 49 lb, wide flange which will carry 181,500 lb at about 20.3 ft of unbraced length. The r_x/r_y ratio for this section is 1.71 and therefore the maximum length at which the column may be unbraced along the major axis is 20.3 x 1.71 or 34.7 ft. This section is adequate for the load.

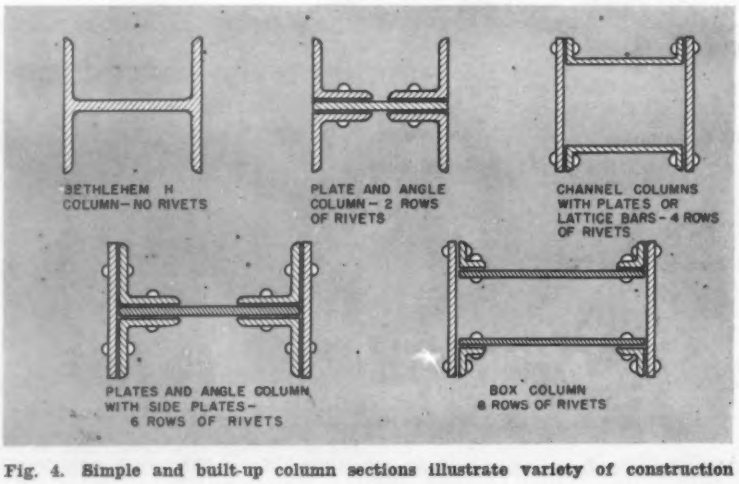
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Fig. 4. Simple and built-up column sections illustrate variety of construction

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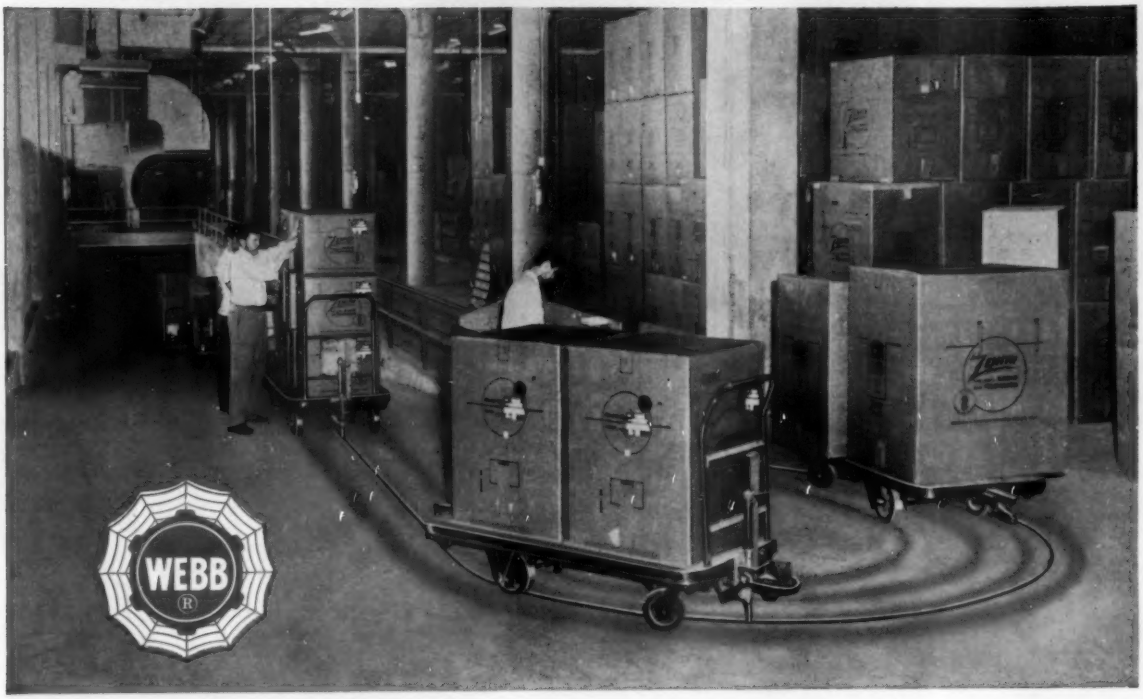

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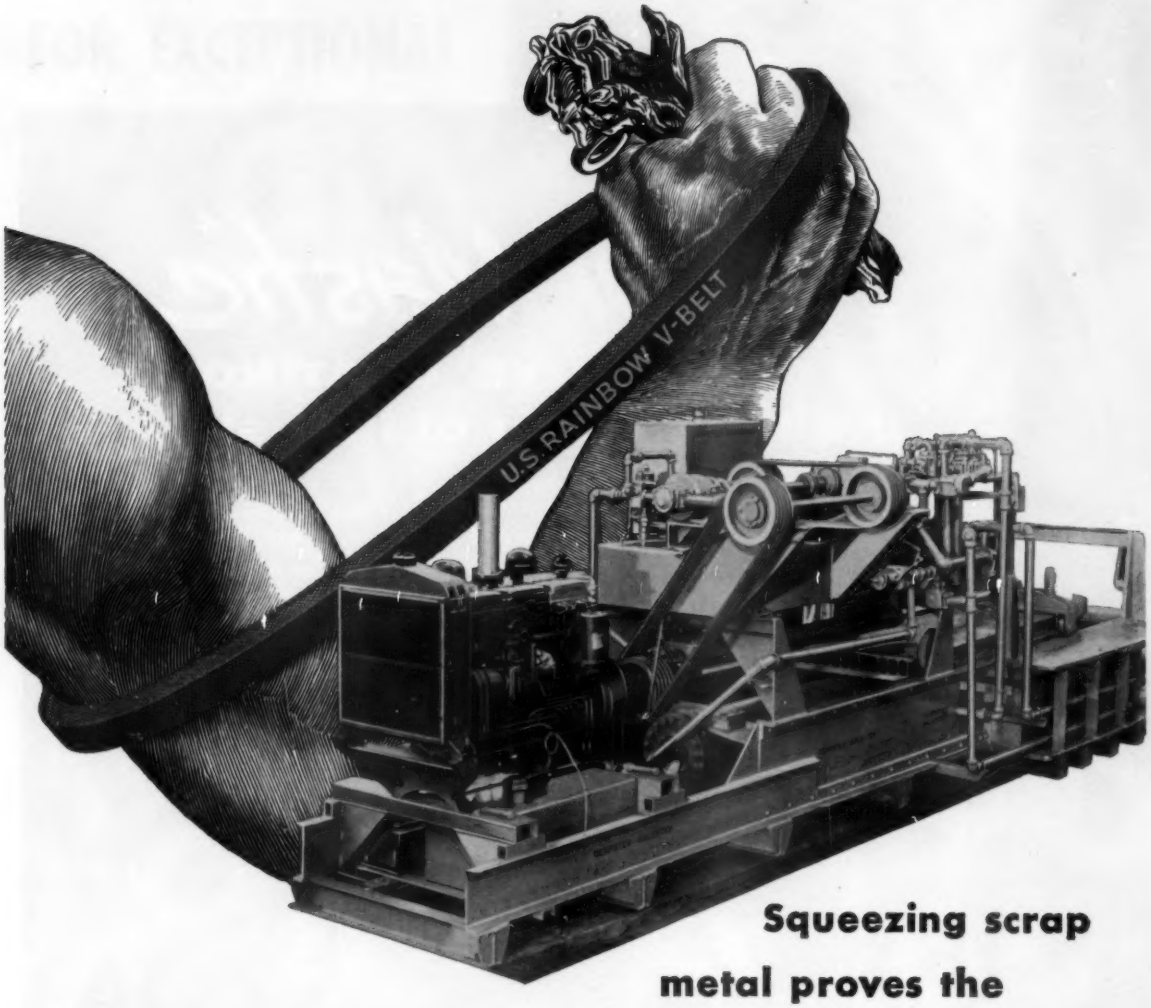

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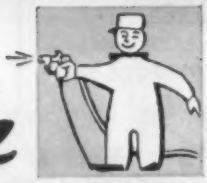

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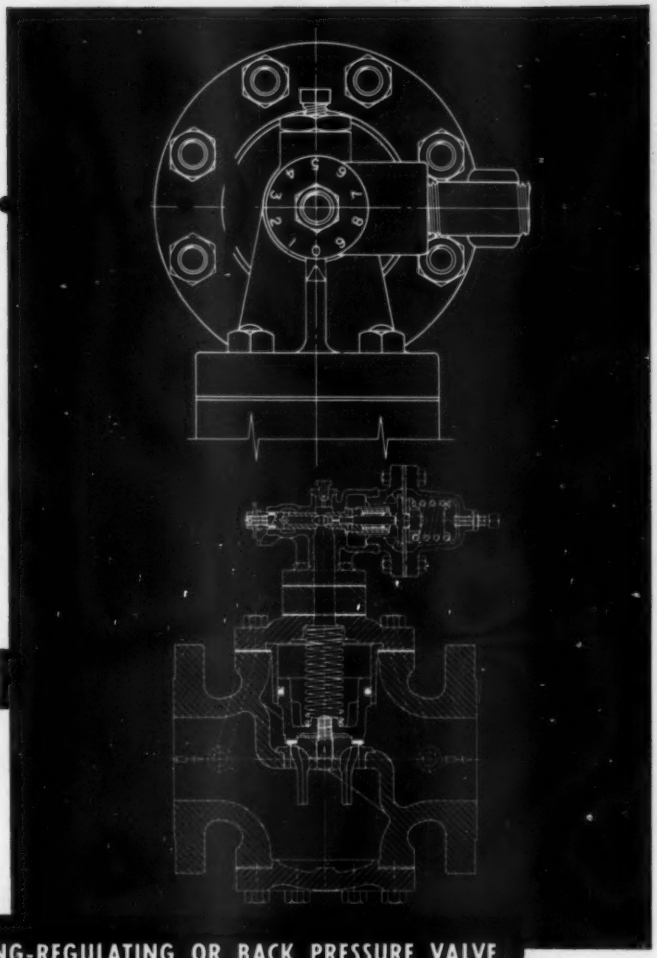

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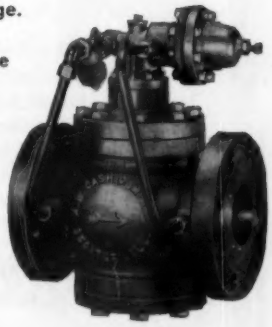

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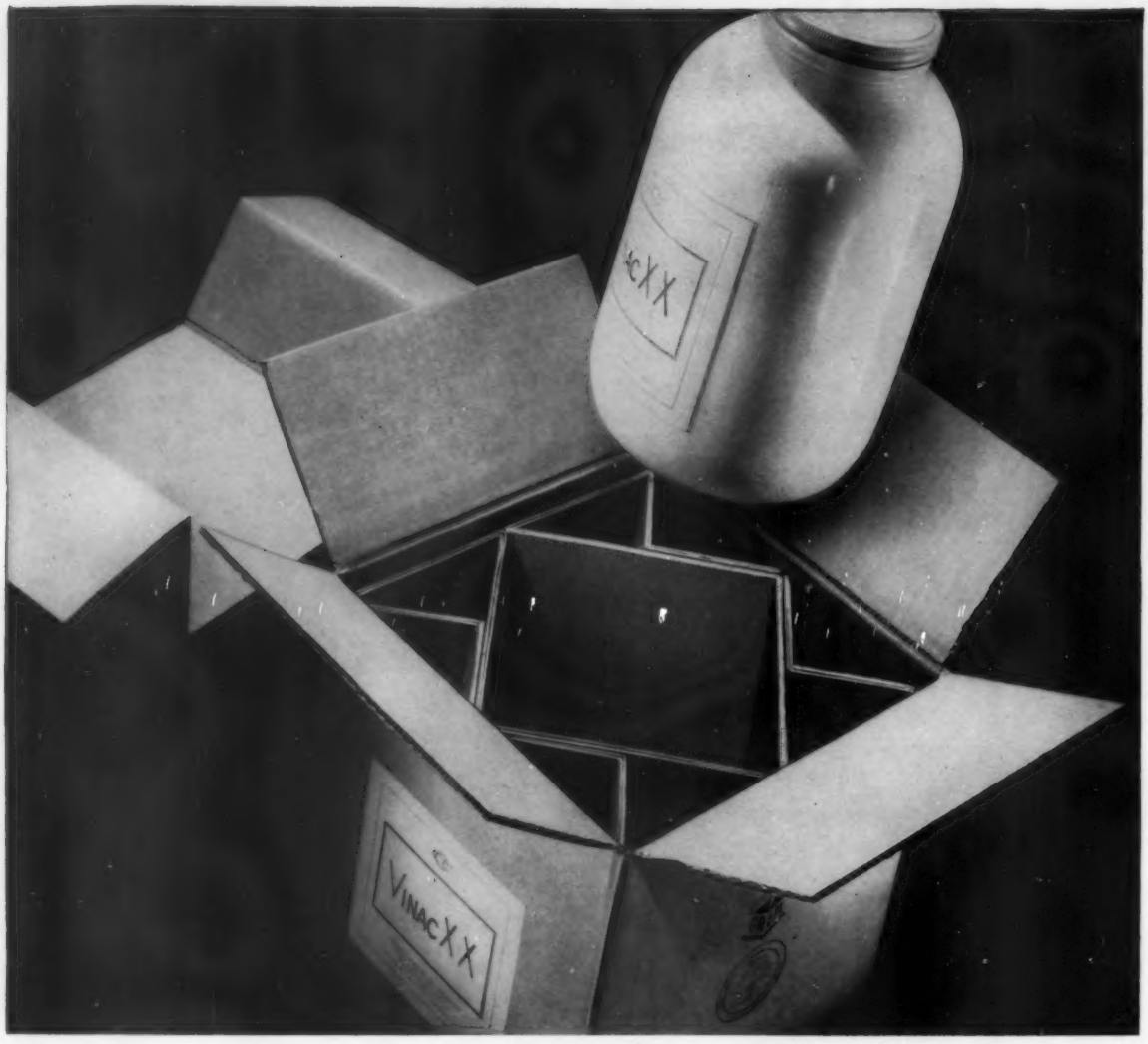

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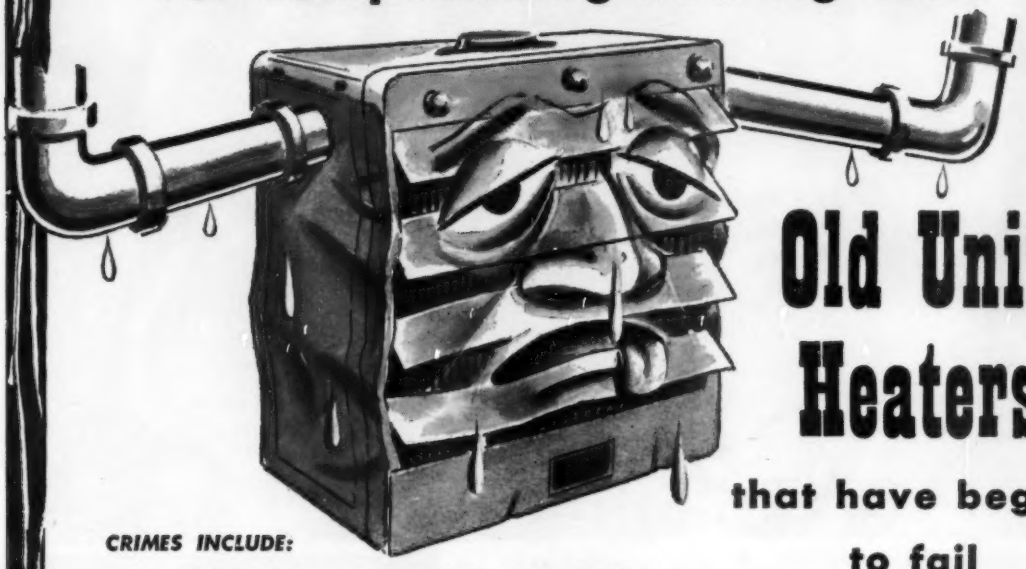

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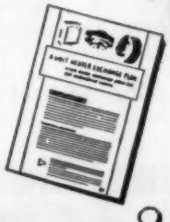

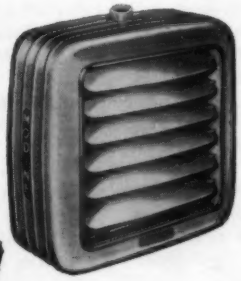

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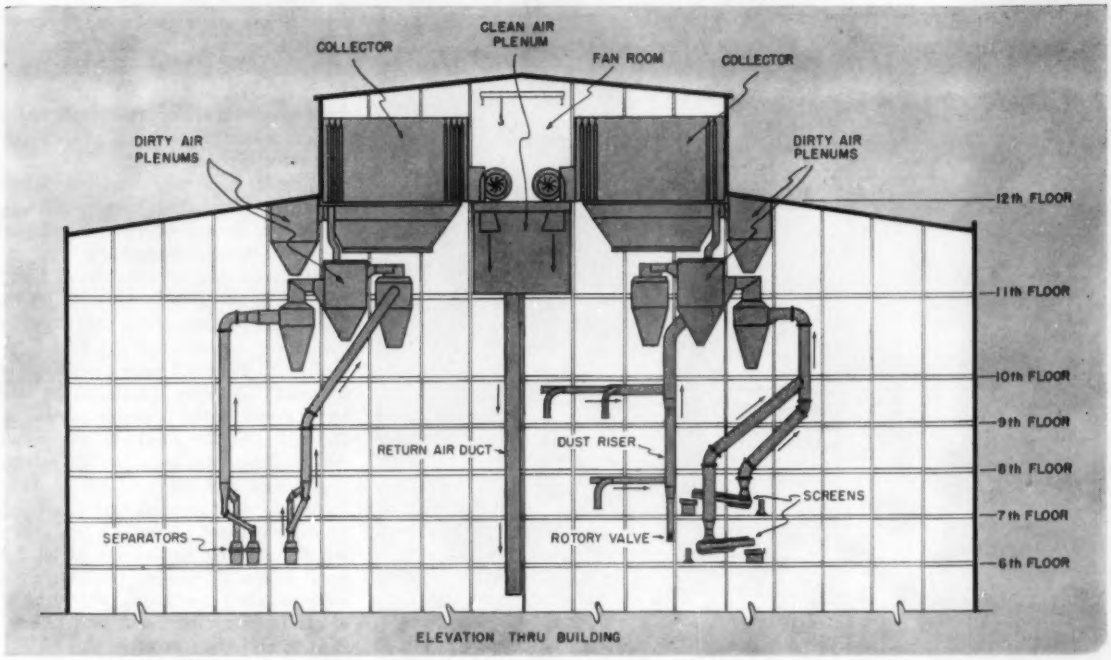


Fig. 1. Cross section through top part of mill shows typical aspiration ductwork; note fans inside the air-tight chamber

To Do Dust Collecting Job—

J-M Makes Top Story of Building an Air-Tight Chamber

By H. C. JESSEN, Project Manager, General Plant Engineering Dept.
Johns-Manville Corporation, New York, N. Y.

SOME OF THE MOST interesting materials found in nature are the so-called asbestos minerals which are all characterized by a highly fibrous structure, resistance to heat and chemical action and possessing great strength. By far the most important of these minerals is the chrysotile asbestos associated with highly basic serpentine rock formations. The largest known deposits of this type of asbestos mineral are found in the province of Quebec in Canada, which produces about 62 per cent of the world's asbestos.

Johns-Manville Corporation has for many years produced this mineral from its Jeffrey mine in the town of Asbestos, Quebec. Up to 1954 the extraction of this mineral took place in a large mill of wood construction. This mill has been enlarged and changed a number of times; however, the production method had become outmoded, and expansion possibilities were limited. A decision was therefore made to build a new asbestos extraction mill of fireproof construction and to incorporate all the latest methods and knowledge of fibre extraction, Fig. 2. At the time this decision was made, it was also decided that this new mill should (1) provide excellent working conditions for the workmen and (2) be a dust free mill.

One has to be somewhat familiar with the fibre extraction problems in the asbestos industry to appreciate the difficulties and problems involved in meeting the second of these requirements. The extraction methods used in the asbestos industries are of the so-called "dry" type, that is, no water is used. This is different from methods ordinarily found in the average mineral beneficiation plant where "wet" methods are generally used.

One of the major problems in the asbestos industry has been the dust problem, inside as well as outside of the mills. To provide a dust free mill was, therefore, a formidable problem very difficult to overcome.

The conventional method used in extracting asbestos from the ore consists of several steps of crushing and extraction of the fibre as it is liberated from the ore.

A series of screening, aspiration and crushing stages are used and the liberated fibre is removed by air suction similar to a vacuum cleaning system. In this manner a mixture of fibre, rock particles and rock dust is extracted and collected in cyclone collectors. This impure fibre is later cleaned by additional screening and aspiration and by other methods requiring air for its operation.

The new mill at Asbestos is designed to treat 600 tons of ore per hour, and in order to extract the fibre, clean the fibre and also provide sufficient dust suppressing facilities, it was necessary to provide a system to handle 2,500,000 cfm of air through the dust collecting system. This job was handled by the company's General Plant Engineering Department.

When considering the various types of dust collectors that could be used, a great deal of background information was available. In Johns-Manville's fibre mill at its Munro mine in Ontario, cloth collectors were used successfully. Several collectors of this type were also in use in the Thetford

Fig. 2. In the foreground is the first half of the mill in Asbestos, P.Q., Canada

asbestos mining district. The aspirated air contains only a moderate amount of moisture. It was therefore concluded that cloth collectors were the natural choice.

In view of the tremendous volume of air to be handled, it was recognized that the design of the air handling system and dust collector merited very careful study. No commercial type of cloth collector could be considered for several reasons. Asbestos fibre has a tendency to plug and pack in any collector with close spacing of the cloth or utilizing small diameter dust tubes of excessive length in proportion to the diameter. Since space requirements were very important, it was found necessary to conduct many tests to establish the most economical design both from a cost angle and from the viewpoint of space needs. After weighing all factors dust tubes 5-in. diam and 14 ft in length were selected as the most economical for this application. Experience up to now has proven that this selection was sound.

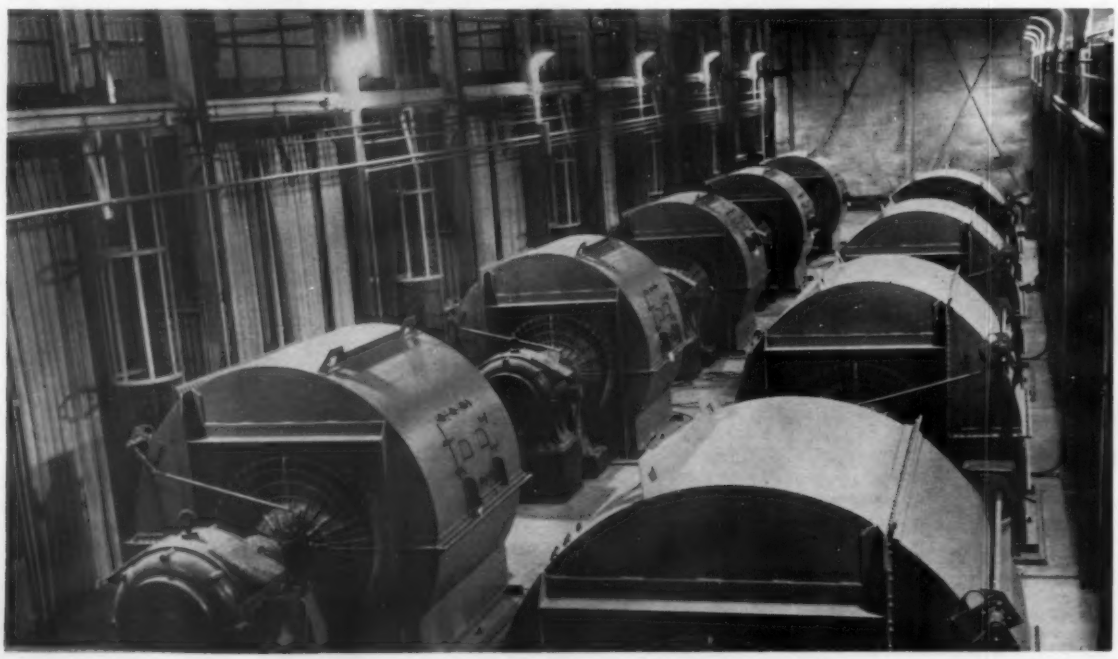
Another important question to be decided was the cloth area to air volume ratio. In this selection many factors had to be evaluated. The installation cost varied roughly, in direct relation to the cloth area. On the other hand, the pressure drop and thereby the power consumption would be excessive if the cloth area selected was too small. Another consideration had to be given to the probable growth of the mill and the need for additional dust collector capacity in the future.

After careful study of all of these factors it was decided that the cloth ratio should not exceed 2.5 to 1. during the shaking period. Based on the final design 22 double compartments were installed containing 24,000 sq ft of cloth per compartment or 1,123,000 sq ft total (25 acres of fabric).

Before the design could be finally established many tentative layouts were made and cost studies as well as equipment studies had to be made. Next to the selection of the dust collector, the selection of the fan system was the most important. In this connection some background information is interesting.

In the majority of existing asbestos mills the general practice was to use large numbers of fans, one on each of

Fig. 3. Specifications called for 18 fan units like these; motors are directly-connected, rated at 350 hp and 2300 v



the aspirating systems. These fans handled the aspirating air and fibre and deposited this mixture into collecting cyclones. The vented air from these cyclones was then drawn through a dust collector by a set of booster fans on the discharge side of the collector. This system might be termed a "push-pull" method requiring double sets of fans and a great deal of space.

System Selection

It was recognized early that if the aspirating pipe lines, the cyclone collectors and the dust collector itself could be made airtight, the work could be done with only one set of fans and utilize a pull through method. However, in order to do this effectively, all aspirating lines had to be carefully dimensioned and the fans selected with good enough capacity and pressure characteristics to insure ample suction in all branches of the aspirating and dust system. In short, a very careful engineering and planning job had to be done.

Advantages of the pull system were obvious; the most important of which would be: 1. Lower overall cost; 2. Higher efficiency; 3. Less space requirement; 4. Added flexibility.

Considerable study was made of the various possible arrangements of the fans and dust collectors. Since many fibre extracting and cleaning systems had to be served which were located at a distance of more than 400 ft, it was essential that the dust collecting system be located centrally to all the systems to be served.

A natural selection was to locate the dust collector and the fans on top of the mill structure in an area running the full length of the building. The whole top floor was set aside for the equipment. Fig. 1.

The top floor is 112 ft wide and 432 ft long and provi ions were made so that 168,000 sq ft of cloth collector area could be added in the future should it be needed.

Several possible arrangements were considered. The conventional method would have been to enclose the cloth area in a steel casing and to connect the fans to the casing. After considerable study it was decided to depart from the conventional and make the whole top floor into an air tight chamber and to locate the fans inside this chamber. This permitted the use of double inlet fans with larger capacity and also gave better working space. Figure 3 shows a portion of the top or dust collector floor.

It was estimated that the pressure drop required for the operation of the aspirating systems would be between 10 and 12 in. of water based on an air to cloth ratio of 2.5. However, it

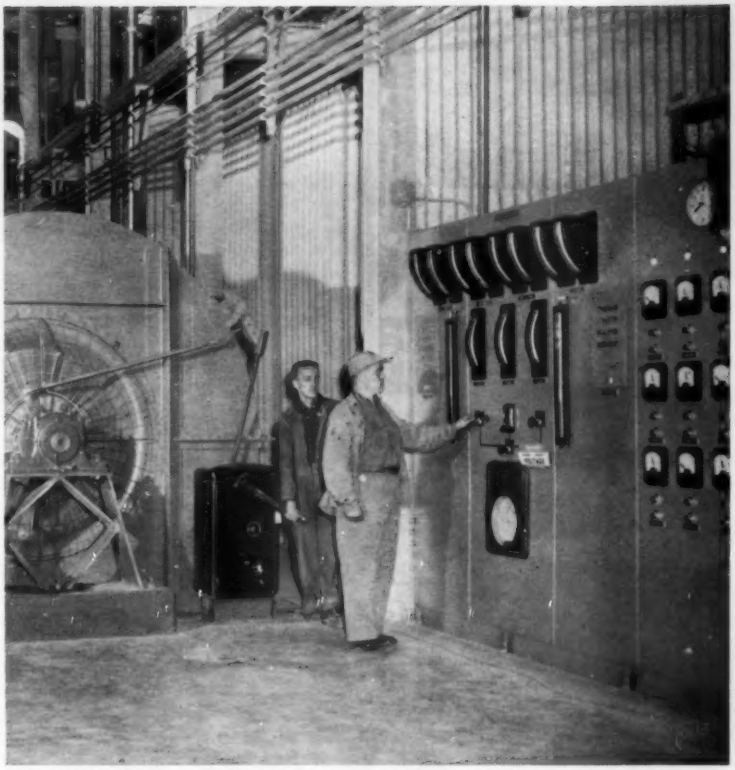


Fig. 4. Employee holds lever of typical volume control unit for both inlets

Fig. 5. Duct (arrow) ties representative shaking screen to aspiration system

was also recognized that future demand upon the collector would tend to raise this ratio and consequently increase the pressure drop above that currently calculated. In actuality the pressure drop proved to be less than calculated and a better margin of safety was therefore attained than had been expected.

The selection of the fans was a project in itself. In the handling of 2½ million cfm of air at pressures of up to 12 in. of water, the fan efficiency becomes extremely important. Studies revealed that the use of backward curved fans with so-called "airfoil" design of the blading should be considered. Unfortunately, such design was fairly new and had not been tried in larger fans of the required type.

Fan Regulation

It was further decided to provide for completely automatic regulation of the fan operation so that the negative pressure could be selected and kept constant automatically. This feature was very important since it simplified the adjustment and operation of the numerous aspirator and dust systems. In order to obtain this type of operation and also in order to operate at high efficiency over a large range of pressure and volume conditions, automatically operated inlet vanes were used on the fans, Fig. 4. A total of 18 fans each driven by a 350 hp directly connected motor were selected. This overall arrangement provided more fans and additional cloth area for any future growth. It might be well to mention that in order to service the fans and the motors a small electric traveling crane was installed.

A centrally located control panel was installed containing all necessary start and stop buttons, pressure gages, timing devices, and pressure control devices. This is shown, Fig. 4.

Since the whole top floor is actually the inside of a dust collector under a considerable vacuum, it was necessary to install air lock doors at all points of entry. The sides of this large room were made air tight by welding a skin of sheet steel on all the walls and using special care in the construction of the concrete floor and roof.

Various grades of fibre are collected in cyclones for final processing and the vented air from these cyclones passes into dirty air plenum chambers running practically the full length of the building. These plenums serve as a distribution system for the air and as collecting chambers for any short fibre that may have escaped collection in the cyclones.

The main fans discharge the clear air downward through enlarging ducts designed for pressure regain into a large clean air plenum running the full length of the building. From this clean air plenum a number of vertical down-comers distribute the air back into the building. The clean air plenum is also equipped with large louvers connected to the outside so that the aspirated air can be discharged to the outside in the summer time.

During the winter months these outside louvers are kept closed and the vertical return louvers are used. At Asbestos the winter temperature frequently goes to minus 25 F and it is therefore essential that the aspirating air is recirculated. Otherwise, 150,000 lb of steam per hour or equivalent heat would be required to warm up the building to a reasonable temperature.

Dust Count

Tests made on recirculated air show it to be exceptionally clean with a dust count of less than one-tenth of that contained in clean city air and comparing favorably with mountain air. In the new Johns-Manville mill, unusual stress was placed on dust control in general and a great deal of effort was expanded to obtain as perfect dust control as possible.

Vertical dust risers were installed in many strategic locations throughout the mill. These were connected to the general dust collector system. All local dust collecting lines were connected to these risers. All dust producing equipment was covered with dust enclosures vented to dust risers Fig. 5.

The mill contains about 100 belt conveyors. For dust control, these are enclosed with dust tight enclosures maintained under a slight suction by connection to the dust risers. After many experiments a suitable design for inspection doors was found; these were equipped with rubber seals. The mill contains about 4000 such inspection doors.

Steam radiators are used to heat most of the offices and wash rooms in the mill. In larger spaces such as shop areas, unit heaters are used. General heating of the floor areas is not employed since the circulated air is warm enough to keep these areas at an adequate temperature when the mill is operating even on days when the outside temperature drops to minus 25 F. The incoming rock contains a considerable amount of heat which is picked up by the aspirating air and distributed throughout the mill by means of the vertical clean air down-comers.

In addition, a very considerable amount of heat is generated from the electrical motors. The mill has a total connected electrical load of about 30,000 hp and all of the heat generated from this equipment is conserved and utilized in plant heating.

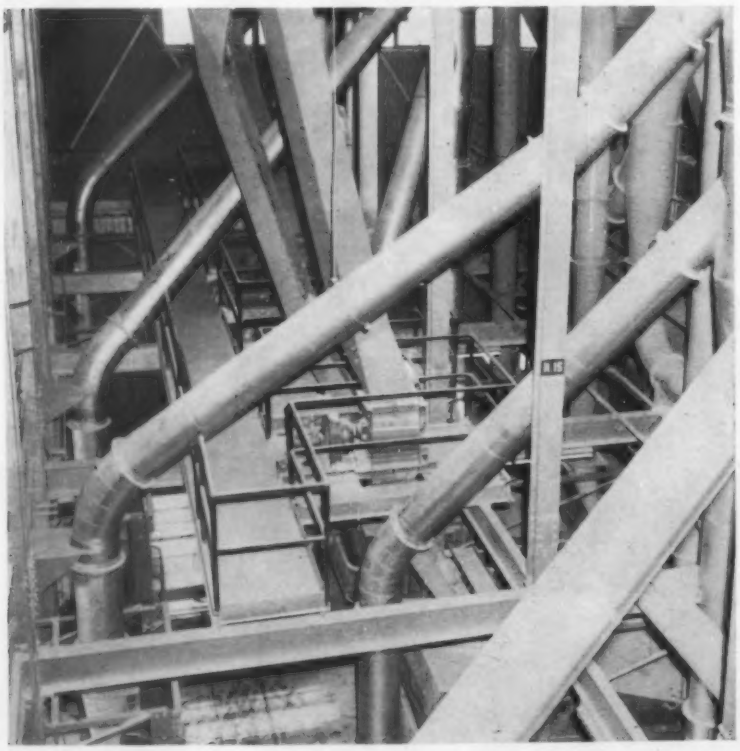


Fig. 6. Part of extensive ductwork which helps control dust from mill operations

Power Supplies for Emergency Lighting

Three Vibrator Power Supply Circuits and When to Use Each

By **ALBERT B. TOLLEFSEN**, Chief Engineer, and
H. E. WEST, Application Engineer, Vibrator Div., P. R. Mallory & Co., Inc.

FREQUENTLY, IT IS desirable to operate fluorescent lights in manufacturing or office areas of a plant when the only possible source of power is batteries, as is the case for emergency lighting systems or where portability may be a requirement. Although these lights can be operated directly from high voltage B batteries, the lumen output will not be as high as the output obtained when the lamps are operated directly from a-c source. Efficiency and lamp life also suffer from direct battery operation.

It has been found that a vibrator power supply, when used to provide high voltage from a battery, provides an a-c output which permits greater circuit efficiency and longer lamp life, thus allowing the designer to use a low voltage battery of greater capacity. The battery may also be of the rechargeable type which constitutes another advantage of using a vibrator supply.

Vibrator supplies for many and varied fluorescent type lamp applications have been designed—for general illumination purposes, germicidal lamps, "black light" for instrument panels and research use. In this article vibrator power supply circuits are described.

Variations in characteristics of each type of lamp must be taken into consideration when a vibrator power supply is designed. To obtain good operation, the power supply and transformer design must be tailored to fit each application. Therefore, it is necessary that the following lamp characteristics and others factors be established before attempting the power supply design:

1. Operating voltage of the lamp
2. Voltage drop across the lamp
3. Operating current of the lamp
4. Filament current required by the lamp during starting
5. Regulation required of the lamp current while operating

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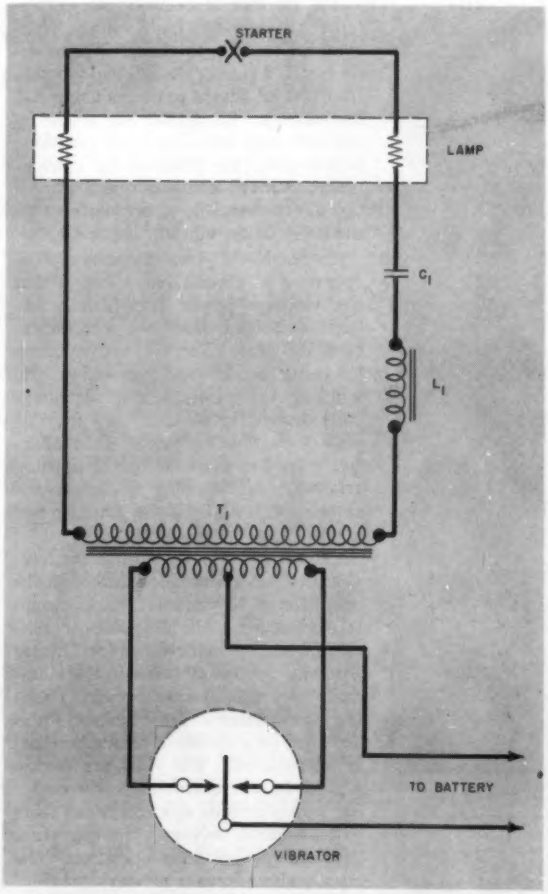


Fig. 1. Circuit No. 1, a typical vibrator power supply similar to that used for 110-volt a-c lamp operation; 110 volts is provided by the transformer and vibrator on secondary side

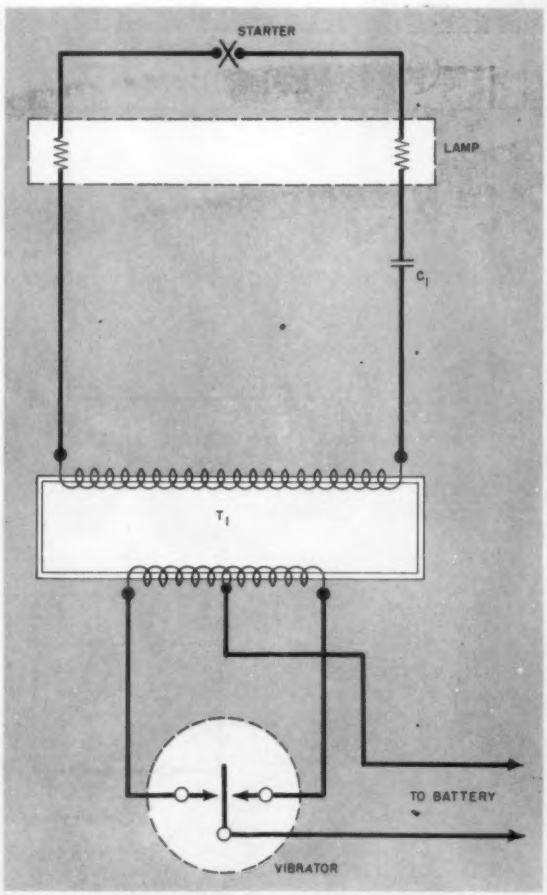


Fig. 2. Circuit No. 2, is same as the circuit in Fig. 1 except vibrator power transformer has been combined with reactor to conserve size of the unit when size is an important factor

6. Power source to be utilized. The power source may range from flash light batteries to large capacity lead-acid cells and may vary over a wide range of voltage but each presents its problem to the designer and so the source must be established in advance of the power supply design.

Table 1 shows the characteristics of a variety of lamps which have been successfully operated from a vibrator power supply.

Vibrator power supplies can be made for any lamp size up to 40 watts rating per vibrator. Where the loading is 20 watts or less, and it is desirable to do so, several lamps may be operated from the same power supply. Where the loading exceeds 20 watts it is usually better to use only one lamp per vibrator as longer over-all vibrator and lamp life will result.

Power supply efficiency will vary according to the application. However, efficiencies ranging from 45 per cent for 4 and 6 watt lamps to 70 per cent for 15 and 30 watt lamps are common. Starting current must be limited through the lamp filaments to prevent burn-out. The starting current is usually 1½ to 2 times the running current. After the lamp is started the current again must be limited to the proper running value or the mercury vapor gas column within the lamp would conduct sufficient current to ruin the lamp. Thus, while there are several different circuits which might be used, all will have this common characteristic of providing regulation of the lamp current while starting and running.

Table I. Characteristics of lamps successfully operated from vibrator power supply

Watts	Rated Voltage	Lamp Drop Watts	Starting Current Amperes	Running Current Amperes
* 4	110-125	37	0.190	0.130
* 6	110-125	46	0.240	0.160
* 8	110-125	59	0.270	0.175
15	110-125	56	0.650	0.305
±15	450-v. Start	170	—	0.100
20	110-125	62	0.650	0.355
30	110-125	103	0.650	0.345
40	110-125	108	0.750	0.410

*These sizes are most commonly used for "black-light" portable use. These lamps have the same operating characteristics as the white or daylight lamps but the type of glass and coloring is designed to pass ultraviolet light.
±T-42, Slimline, 42 in. long, hot-cathode type, no filament.

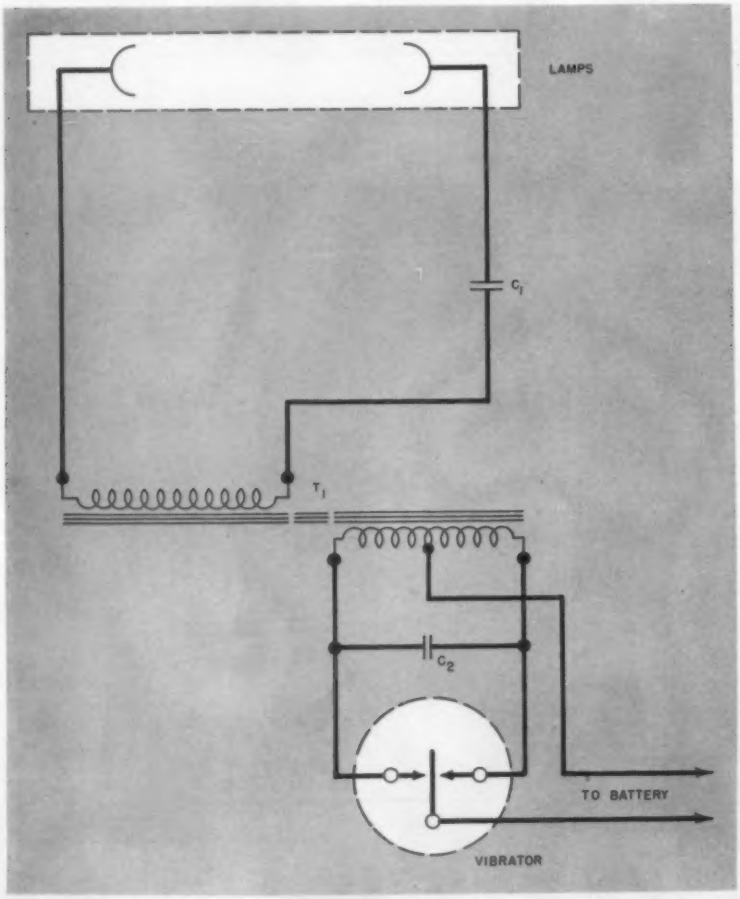
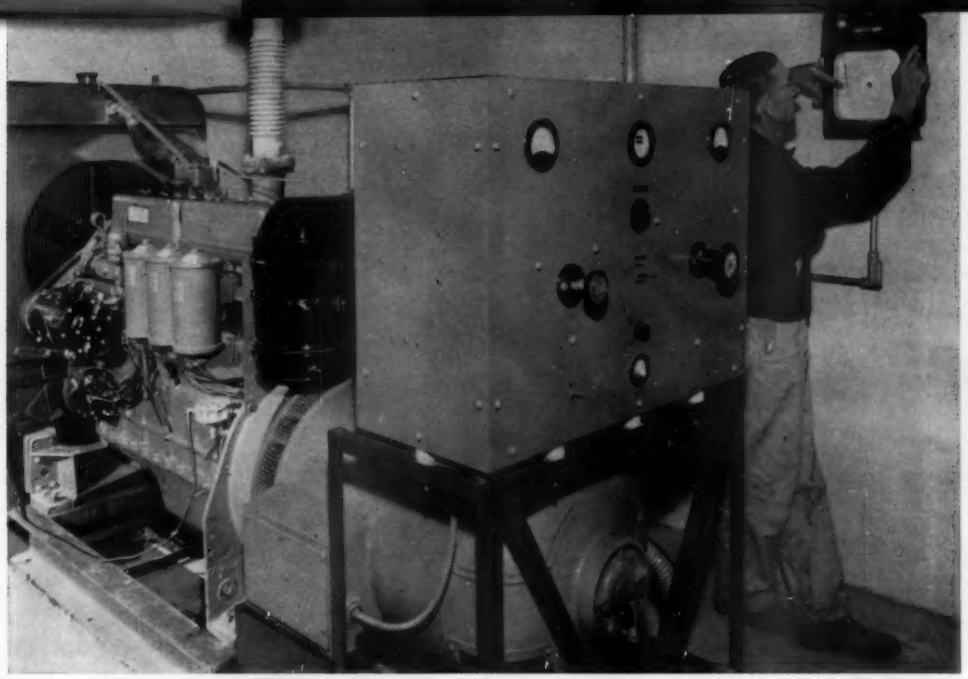


Fig. 3. Circuit No. 3 is quite different from first two although operation is similar; it is designed for use with self-starting lamp which has no heater filament. Hot cathode provided at each end of lamp assists starting and prevents blacking

Circuit No. 1 shows a typical vibrator power supply very similar to that used for 110 volt a-c lamp operation. The vibrator and transformer provide 110 volts a-c on the secondary side. L_1 is an iron core reactor similar to that used for 110 volt, 60 cycle use except that it is designed to operate at the vibrator frequency. The inductance provides the high voltage transient for starting the lamp. The transformer T_1 follows conventional vibrator transformer design practices using E-I laminations. Condenser C_1, made by our company, has a two-fold function; first it takes the place of the conventional "buffer" condenser and it provides for essentially a zero-current on the break of the vibrator contacts.

Circuit No. 2 gives the same type of operation as Circuit No. 1 except that the vibrator power transformer has been combined with the reactor to conserve size. This is accomplished by using an L type lamination and winding the primary and secondary coils separately so that they may be placed on separate legs. This effectively isolates the coils by the limiting reactance of the long flux-path and closely controls both the starting and running current of the lamp.

Circuit No. 3 is quite different from Circuits No. 1 and No. 2, although the operation is very similar. This circuit is designed for the slim-line or self-starting lamp which has no heater filament. In this circuit also the vibrator power transformer serves as both the transformer and the reactor. It is designed on a double-E lamination and is butt-stacked. The coils are wound separately and assembled on the center leg with a definite space between them to provide the necessary limiting reactance for proper lamp operation. The circuit also shows a primary "buffer" condenser C_2 which is necessary on all circuits operating from a 12-volt or higher battery.



Wall-mounted recording meter checks up on self-started maintenance runs of standby unit

Incoming sea water is filtered and aerated before passing on to fish tanks in the background

Self-Testing Standby Unit

It Readies Itself for Emergency at Big Oceanarium

WHAT'S THE MOST neglected piece of equipment in your plant? A drive-motor geared to a production tool? No—because it operates a daily-use machine and management insists upon scheduled maintenance. Maybe a material handler's drive-motor? Unlikely — because it's essential to another piece of equipment used every day.

Likely your plant's standby motor-generator set is most neglected.

Sure, it's scheduled for monthly maintenance runs. But does it get them? In many a plant the answer's "sometimes yes, sometimes no — depending upon more pressing, higher priority jobs." Yet this neglect can bring disaster when the jig's up—when there's a main power failure.

Yet at Marineland of the Pacific, plant engineers pamper their gasoline engine and generator standby. And with reason. For the spanking new, $3.5 million structure is the world's largest oceanarium, home of some 5000 fish valued at more than $100,000. And any prolonged interruption in the dumping of 2000 gpm of sea water (or addition of a similar gallonage every minute), could doom the plant's finny livestock.

Marineland employs a specialized maintenance staff to look after the plant's miles of piping (cast-iron, concrete-lined; Uscolite and Transite), its remotely controlled hydraulic valves and eight filtration beds. All have but one function: to add 2000 gal of make-up water every minute and to dump a like amount into the Pacific from which it came. New water is needed to replenish oxygen in the plant's two main tanks, which together hold some 1,100,000 gal of sea water.

Two standbys assure that, despite power failure, the 2000 gpm change will continue without interruption.

One standby—a Hercules Model RXLD motor—is clutch-connected (Twin Disc clutch) to one of two Johnston turbine pumps, driven by a 100 hp motor, and rated 2000 gpm each. The Johnstons pump seawater from a beach-side sump to the Oceanarium's filtration beds, located 160-ft above the beach, but 2000-ft by a 12-in. dia. Transite line. Pumps, the standby engine, and a sump-house Chronoflo Telemetric Transmitter (which continuously records sump level) are monitored from a filter house on the Oceanarium's filtration deck.

More interesting, however, is the Oceanarium's power standby — a Model S-820 6-cylinder Continental gas-engine (205 hp at 1800 rpm) which drives a 125 kva, 100 kw Delco generator. This standby is charged with operating two all-important circulatory pumps—a couple of 3500 gpm units driven by 40 hp General Electric motors. These keep fresh salt water circulating in the main fish tanks.

So important is this standby that it is rigged with automatic maintenance run controls. There are mounted within a Bristol indicating meter. Controls: (1) automatically start up the emergency set ten times a month; (2) operate set for adjustable periods up to 9½ min during each of the 10 start-ups; (3) record these maintenance tests automatically on the Bristol graph; (4) perform load transfer automatically should there be a power failure.

The important thing though, is the standby's self-testing circuit. Control is one more step forward towards completely eliminating human error in the maintenance of emergency power units. Ordinarily, of course, maintenance men make the test runs. But should this be overlooked, management has no way of knowing (until a power failure and maybe failure of the standby) that test runs have been neglected. Then it's too late—and might mean death for the Oceanarium's 5000 valuable inhabitants.

At Marineland of California, staf-

(Continued on page 158)

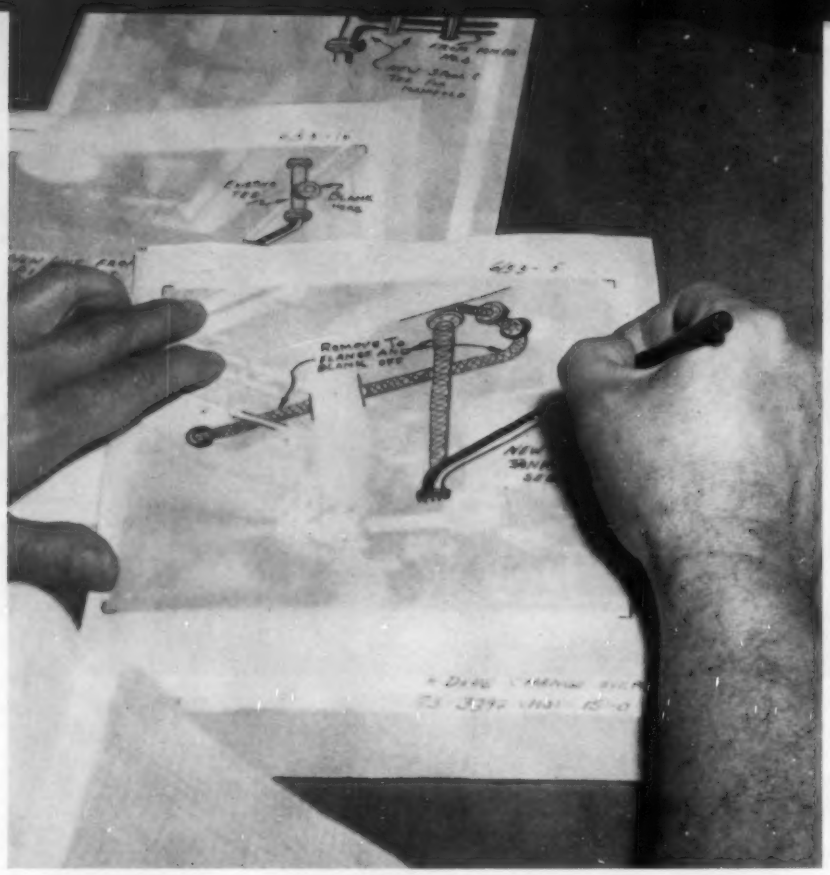


Fig. 1. A piece of tracing paper is first laid over the photograph and the piping changes—additions or removals—are made thereon. Next a sepia foil overlay is made and this is stapled into position on the print for easy reference as the remodeling work proceeds

Camera Short Cuts for Plant Changes

By H. A. BURNS, Manager, and W. R. SUTTON,
Production Division, Ansco, Division of General Aniline and Film Corp.

PHOTOGRAPHY as a production or maintenance tool to save money in chemical process industries is quite often overlooked. With the present shortage of draftsmen and the comparatively high cost of making drawings, it is imperative that short cuts be made in preparation for numerous piping alterations required to meet the constantly changing market conditions and improvements in processes. It is almost axiomatic in the chemical process industries that in spite of the best intentions many of the drawings of process lines are out of date and in many instances what drawings do exist are practically worthless as they have not been kept up to date.

Photographs can be used as an aid in bringing the drawings up to date, especially for correcting flow charts, as many trips to the field by the draftsman can be saved by photographing the piping and making the corrections to the drawings using the photographs as reference.

Another use of photography can be made at the time when process piping must be dismantled for cleaning and later reassembled or altered. Photographs are much better and easier to read than regular drawings as they show the location of the hangers, the positioning of the valve handles, etc. Also, less skilled men can be used as the need to be able to read blue prints is eliminated. This has a considerable advantage as on rush jobs and during shutdowns the operators can be used to supplement the regular maintenance men.

Each length of pipe and fitting should be numbered before the dismantling is started. As many of the cleaning solutions will remove painted numbers, several industries are using aluminum or stainless steel bands with embossed numbers, which are easy to make and install. These bands provide a permanent marking which may be quickly removed, if necessary.

When piping systems are to be altered the changes can be indicated directly on the photographs but it is necessary to mark each print. The prints should be made on a paper having a mat surface such as Ansco Brovira Kasmir so that the marking with a soft pencil or ink will show up.

If more than one print is required, which is usually the case, the marking of prints is a time consuming job and the marking of multiple prints may

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Authors Burns and Sutton prepared this article as a joint paper which was delivered by the former as part of a symposium on Engineering Applications of Photography preceding the Photographic Society of America's National Convention in Chicago, October, 1954. The paper was later published in the Society's official organ, Photographic Science and Technique, February, 1955.

lead to errors. One way to eliminate marking multiple prints is to indicate the alterations on an enlargement and make a photostat of it. This requires considerable skill and many companies do not have the special photographic equipment required.

A faster and cheaper procedure is recommended when multiple prints are required. This method consists of using photographs of the existing piping with an Ozalid Sepia Foil overlay showing the changes. The method of making these overlays is as follows: Enlarged 8 in. by 10 in. or 10 in. by 12 in. prints should be made, a piece of tracing paper placed over the print and the required changes drawn on the tracing paper.

Only the changes should be indicated on the tracing paper, which can be done quickly free hand. The tracing paper is then removed from the photograph and an Ozalid Sepia Foil print made from the tracing. This transparent foil is then fastened across the top over the photograph so that it may be lifted to check the original layouts. In practice it is usually necessary to make at least three sets of prints, one for the field, the second for the Engineer and the third sent to the Drafting Room for record purposes.

A process engineer can usually indicate the required changes to the piping shown on a photograph in about 30 minutes. If complete new drawings of the piping system showing the interferences, such as columns, air ducts, sprinkler lines, etc., were made, it would take many hours. It is estimated that photographs with the foil over-lay showing the changes, cost less than one-tenth that of making conventional drawings.

Following is a specific case in a chemical industry which indicates the savings that can be accomplished using this procedure. About one month before the summer shutdown, it was decided to make extensive changes to the dope piping and to dismantle a major portion of all this piping for cleaning, preparatory to starting up on a new type dope. It was estimated that it would cost in the neighborhood of $3,000 to $4,000 to make the required drawings. Neither time nor manpower was available so the project engineer had the photographs taken and made the foil overlays in a very few hours without interfering with his many other activities in connection with the project. A set of prints was given to the drafting room so that the drawing could be corrected later.

What has been said about photographing process piping holds as well for process equipment. The equipment should be photographed from several

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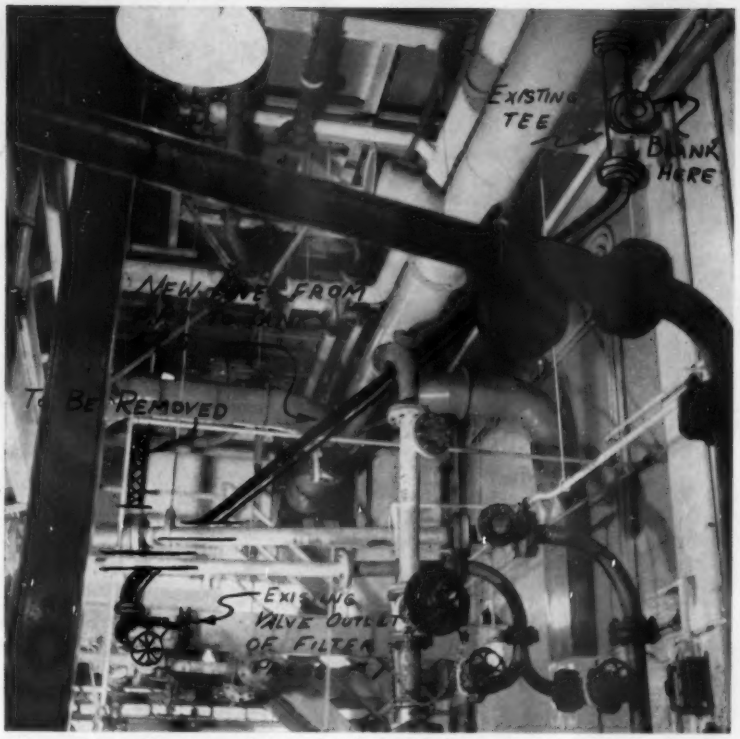


Fig. 2. One of the piping change sketches made by project engineer in planning H Dope Changeover. Photographs are reproduced in color here to permit greater visibility. Actually, the drawing is the portion reproduced on sepia transparency

Fig. 3. Photo shows ease with which changes are indicated on photographs. Entire changeover job is speeded up and copies of photos sent to drafting department allow record drawing changes as time permits. Method has speeded work

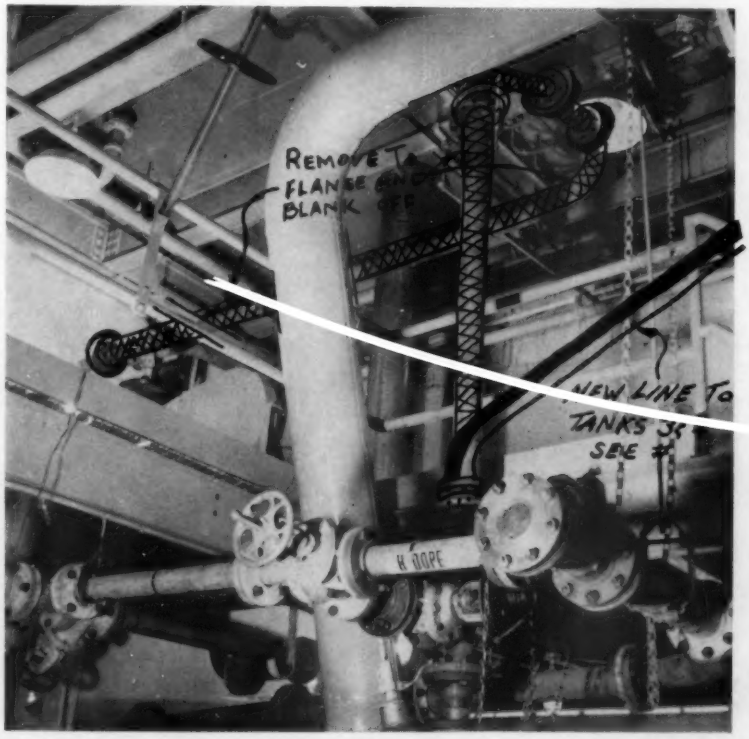


Fig. 1. Hotpoint solved its problem of more space by building a completely new building over one section of the old plant. A portion of the old plant can be seen under the steel structure of the new section

Standardizing on Construction
Helped Hotpoint Keep Close Tab on Costs

By E. M. SHAW, Manager of Utilities and Buildings, Hotpoint Co., Chicago, Illinois

Fig. 2. Here's another view. Note that the roof and some of the conveying equipment of the new building has already been installed over the old plant

MANY PLANTS today are faced with the problem of alleviating their need for more plant operating space. One decision may be to build a new plant; another may be to get more out of the present plant.

The second alternative is just what we did at Hotpoint to help handle an increase in production of our washers and dryers.

Numerous discussions were held to determine just what would be the best way to go about getting more plant operating space. We had first considered the possibility of building a new plant. However, with no other available space near our present site, it would be necessary to have several of the operations in another plant some distance away. Naturally, this would not be a suitable arrangement.

Our second consideration was to see what we could get out of the existing buildings. Since all of the present buildings are one-story, sawtooth and monitor construction, we decided to build the equivalent of a new three-story plant right over one section of the old plant.

Construction in the new plant fol-

Fig. 3. View of new building in rear of plant which houses new enameling furnace. Lower portion of building is of pre-cast panels which were poured on the job

lowed the same basic patterns which were incorporated in our company's new refrigerator plant and electric range plant. This type of construction permits in-line manufacturing operations and minimizes the use of columns. It also increases production efficiencies and utilizes every inch of floor space.

While the actual space in the new home laundry plant is not increased in square feet, it is practically doubled in cubic footage, with additional height.

By adopting a standard size of 100-ft span with 40-ft bays, we are able to order in standard lots. Since this standard size construction was used in our other two plants, we were in an excellent position to keep a close watch on the costs for erecting this building.

You may wonder how we arrived at this standard size. After discussing the question with several structural steel men and comparing notes with some of the men in the plant, we finally decided that the best arrangement for all practical purposes would be a 100 ft by 40 ft bay, with 40 ft of space from the bottom of the truss to the floor.

Because of this standard construction, it was possible to pre-estimate building costs—based on figures we compiled from the two previous buildings we constructed.

This duplication of design has permitted favorable purchasing of materials and equipment. This has proved a tremendous advantage. Other equally important advantages of standard design and details have resulted in the speed and economy of construction. Referring to our data on the previous buildings, we were able to adopt the same general methods, form work, construction and other details.

Fig. 4. View of front of new building. Since building is similar to others company built, it was possible to keep close watch of construction costs

The present structure is 562 ft by 100 ft and construction of it began on April 10, 1954. The outside of the building was finished in December. Although the inside of the new section is not complete, we are using quite a bit of overhead conveyor system for storing and transferring parts to the various operations and then to the assembly line—which is located in one of the older structures.

It is interesting to note that the production of the washers and dryers was maintained throughout the construction period. In fact, following a model change, production even increased.

While the girders for the new building were being installed, necessary safety precautions were taken to see that no personnel were directly beneath the area over which the girder was traveling. In fact, such areas were roped off and guards posted to see that no personnel entered this restricted area.

Another precaution was the constant patrol of the roof by a fire watch to check any fires that might start during the construction period. The patrols were equipped with fire extinguishers and other necessary equipment to prevent a possible fire.

Conveyor Storage Area

Because of the new enameling furnace which we planned to install, it was necessary to erect another building at the rear of the plant to house this new furnace. The lower portions of this building consist of precast panels, poured on the job, the upper portion is glassed in.

Because of the limited space, the air rights in the new building are being used to store as well as convey the various parts from operation to operation and finally to the assembly line. When finally completed, there will be approximately 7 to 8 miles of conveyors to serve as storage area. Additional parts can be routed from this storage area when needed.

Trusses for this building have been designed for a 10 ton concentrated load and a 20 ton evenly distributed load. The usual standard truss can handle a 5 ton concentrated load and a 10 ton evenly distributed load.

When the plant is finally completed, the overall operations will begin with the steel coming in the east end of the building. From here it will move to the presses where it will be formed into required parts. Then these parts will be placed on the conveyor racks, which dip down close to the presses. From here on in the parts begin their long voyage through the necessary operations until they come off the assembly end as a new washer or dryer.

Illustrations: Powell Pressed Steel Co.

Fig. 1. Fork truck operator sets tote box on the stand which automatically raises the end gate as the box lowers itself into position. Valve tappets are here being put into a hopper from which they will be withdrawn by an automatic loader

900 Pallets Are Real Gone, Here—

Handling Small Parts In Big Boxes Speeds Work at Eaton

By M. L. ZUEHLKE, Chief Industrial Engineer and
L. A. JAHN, Plant Engineer, Eaton Manufacturing Co., Saginaw, Mich.

WHEN YOU'RE FACED with a handling problem it's axiomatic that the more the units the higher the cost; the more the containers the greater the maintenance; the more manual lifting the slower the work. All of these costly conditions confronted the Saginaw, Michigan, plant of Eaton Manufacturing Co. where we manufacture hydraulic valve lifters and valves for many new model V-8 engines as well as valves and tappets for several makers of L-head engines.

Obviously, this line of products calls for the handling of many small parts. Tote pans were employed for this purpose until recently. As shown in Fig. 3, with the old tote pan method ten pans were stacked by hand on one pallet, two stacks side by side, five pans high. These were lifted onto the pallet and onto each other by hand, an operation requiring a great deal of vertical manual lifting.

These old tote pans held 200 parts and it required 9000 pans and, of course, 900 pallets, for the day's operation. Due to the hard wear these pans received, it was formerly standard operating procedure to reinforce the corners of these pans before they were put into service. Otherwise, it was only a matter of days before the corners would puncture or tear. In addition, the pans frequently would wedge into each other making it necessary for the operator to shake them loose before returning to his machine. Few facets of the operation contributed to high production and low costs.

All of this has now been changed. The company recently installed a new parts handling system consisting of a parts box whose end wall is a vertically sliding gate which automatically raises when the box is lowered on its stand; the stand is the second part of the system. A fork truck operator, see Fig. 1, can, by himself, handle the job of exchanging boxes with no assistance or guidance by the machine op-

Fig. 2. Here's another standard application of the new tote boxes in which valve tappets ready for a rotary face grinder are gravity-fed through a chute into a confined area where they are within easy reach of the operator for handling

erator, with minimum interruption.

These parts boxes, called Flow-Matics, hold 600 parts in comparison to the 200 capacity of the old tote pans. Eaton Manufacturing Co. purchased 300 of these tote boxes and 75 stands. With this set-up the 900 pallets and their consequent maintenance have been eliminated. Also eliminated has been the problem of separating the machined from the unmachined parts. This formerly could be solved only by the use of two pallets and this caused undue crowding or ridiculously unnecessary lifting in order to handle both machined and unmachined parts on the same pallet.

It was uneconomical to more fully automate the handling and working of these small parts. Production runs on any one type of part were too short to devote the time of a single-purpose machine tool to their machining day in and day out. Thus, no matter how fully automated some portions of the plant and some operations become (inspection, for example, is becoming highly automatic) the job of moving various parts between production machines will probably always be some sort of batch operation.

In the first few months' operation, with reduced maintenance and handling costs, it is apparent that this new system will be a vast improvement over the old handling method.

Fig. 3. The old system involved ten small tote pans, stacked five high

Aluminum Paint

When and How to Use It for All-Surface Protection

By W. F. TORREYSON, JR., Engineer, Aluminum Company of America

PLANT ENGINEERS are finding aluminum paint one practical answer to their painting and maintenance problems. Aiding these engineers are the producers of aluminum pigments and paints, advising on the "when" and "how" of successful application.

Except for specialized applications, the use of aluminum paints by industry falls into three general classes. These are: (1) for metal, concrete, masonry and other hard surfaces; (2) for weather-exposed wood; (3) for heated surfaces.

For application to metal, brick, and concrete surfaces, a hard drying, medium-bodied paint, containing waterproofing resins and sufficient oil for elasticity, is required. Wood is moisture-absorbent, and swells and shrinks with changes in humidity. Thus, weather-exposed wood requires a full-bodied paint, rich in oil, that can expand and contract with the wood without flaking and cracking. And, of course, heated surfaces require a third type: a low viscosity paint, in which most of the oils are replaced by special resins, which will protect surfaces heated to 800 F.

Steel. Aluminum paint has become one of the most widely used protective coatings for steel, not only because of the durability of the paint, but also because it is light and attractive in color, reflects radiant heat, and gives industrial properties a well-kept look.

The importance of a clean surface cannot be over-emphasized in painting steel. After removal of dirt and grease (by washing with mineral spirits), steel surfaces should be made as free as possible from all loose rust and scale. This may be done by sand-blasting, or by using steel scrapers and wire scratch-brushes. Interior steel work ordinarily requires a rust-inhibitive priming coat; but aluminum paint may be applied directly to bare steel after cleaning if the structure is not exposed to fume and bad moisture conditions.

If, however, it is a weather-exposed surface, a primer should be used. The surface should be dry before application. Good primers are made with red lead, blue lead, zinc chromate, or similar good rust-inhibitive pigments.

After the primer has dried, one or two finish coats of the suitable aluminum paint may be used. The first coat will be found adequate for hiding; and a second coat gives durability.

Galvanized Iron. Weather-exposed galvanized iron may include surfaces on transmission towers, corrugated siding, gutters and downspouts, roofing and metal ventilators. Treat the galvanized iron with one of the proprietary phosphate treatments designed for this purpose, and rinse with clean water. Allow to dry. Then apply one or two coats of aluminum paint, or one coat over a zinc dust-zinc oxide primer.

Galvanized iron on interiors may include corrugated sheet, pipe, hot air ducts, furnace jackets, and tanks. Apply the phosphate treatment and then one or two coats of aluminum paint.

Weather-exposed tinplate. Tinplate is often used as a roofing material, and is customarily protected against rusting. Aluminum paint should be applied to it soon after installation. On new tinplate, wipe off grease and dirt with mineral spirits, and apply one or two coats of aluminum paint.

Where tinplate has rusted, scratch-brush thoroughly and brush off dust. Then apply rust-inhibitive primer followed by one coat of suitable aluminum paint.

Aluminum. While the metal, aluminum, is resistant to corrosion, it may require painting in certain applications. Such surfaces may include gutters, flashing, and other exterior surfaces which may be wetted for long periods. Other architectural parts may be painted for the decorative effect and to match other building areas.

For weather-exposed parts, allow the aluminum surface to weather for about two months. Brush off surface dust and dirt with stiff bristle brush, sanding lightly where necessary. In cases where aluminum must be painted at once, treat surface with a diluted proprietary solution containing phosphoric acid and grease solvents. Follow this by rinsing with clean water and drying. Apply one or two coats of suitable aluminum paint, or one coat over a zinc chromate primer. Do not use a paint containing lead as a priming coat.

For interior surfaces, sand lightly and clean with solvent, or treat with phosphoric acid solution, as described for weather-exposed surfaces. Apply one or two coats of aluminum paint.

Concrete. Before painting fresh concrete, the surface should be allowed to age for at least several months; or it should be treated with a zinc sulfate solution to neutralize any active alkali.

The concrete surface should be thoroughly scratch-brushed to remove dust and loose material. Then apply one coat of suitable aluminum paint as a sealer and primer; after at least 48 hours, apply a second coat for increased protection against weathering.

Brick. The painting of brick is usually done for purposes of decoration. On interior walls of plants, where

Fig. 1. Painters apply aluminum paint as prime coat on welded piping

Fig. 2. Reflectivity of aluminum paint prompts its application to wooden overhead

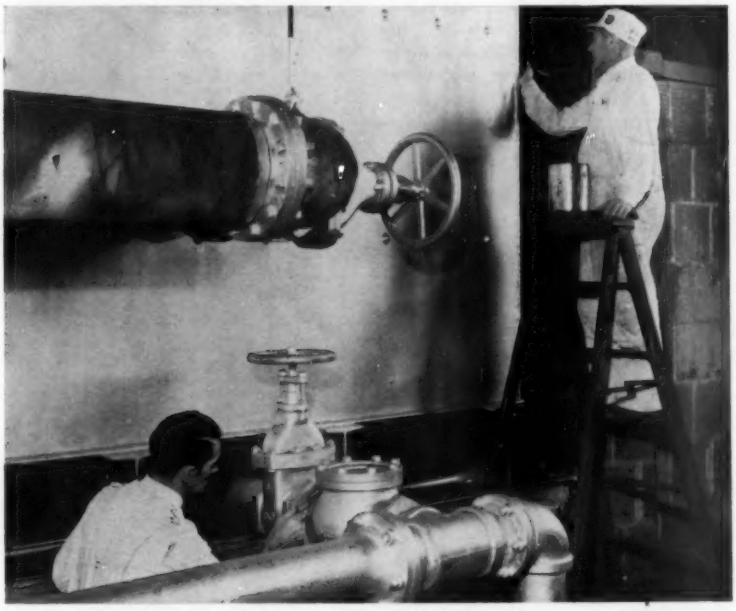


Fig. 3. Water tank and piping get corrosion-preventing coat of aluminum

Fig. 4. Aluminum paint on masonry provides reflectivity for safety on stairways

smoke-darkened and discolored brick surfaces are present, a single coat of aluminum paint will provide a surface that reflects light efficiently and improves lighting conditions.

Aluminum painting of brick surfaces is a simple operation. One coat of aluminum paint, either brushed or sprayed, will easily hide any colored brick. Surfaces with new mortar joints should be treated with a water solution of zinc sulfate. Old brick requires only a good cleaning with a stiff brush to remove all loose material before painting.

Plaster. Aluminum paint has been used extensively as a finish coat on industrial interiors. After at least a six month aging of industrial interior surfaces, or on previously painted surfaces, clean well and remove all loose materials. One coat is sufficient.

Composition roofing, stucco, gypsum and wallboard, and canvas. Aluminum paint has been used on all of these surfaces. Stucco, like concrete, should be aged sufficiently. This weathering requires from four to six weeks. In all of these, the surface must be completely dry before paint application. And, of course, it must be thoroughly cleaned, and free of loose material. Apply one or two coats of aluminum paint, depending on durability desired.

Aluminum paint may be applied with a brush, or roller, or it may be sprayed. Each application has its advantages. Obviously, large industrial surfaces are particularly suited to spray painting. Where detail work is desired, or surfaces are of moderate size, and easy to reach, brush painting is preferable. Roller painting is used extensively on walls, fences, and other flat surfaces.

In spraying aluminum paint, observe several precautions. Guard against using too little paint. The high hiding power of aluminum paint is best illustrated by the fact that an aluminum paint film 0.5 mil in thickness will completely cover any colored surface. Make frequent checks on covering rate per gallon; average rate of 500 sq ft per gallon is considered normal.

The plant engineer should remember the five "whens" and "hows" of painting with aluminum:

1. Prepare surface.
2. Be sure of dry surface.
3. Select dry day: no moisture, no wind to blow overspray.
4. Use primer to inhibit remaining rust.
5. Spray, roll, or brush on one or two coats, depending on desired durability.

Work Simplification—
How to Improve Materials Handling Operations

By LILLIAN STEMP, Special Technical Reporter

IN PLANT ENGINEERING the problems involved in materials handling are an ever-present challenge to improvement. If you have an open mind, a questioning attitude and will remember to consult all those concerned, you can apply work simplification to any phase of materials handling and bring about noticeable improvements.

These may take the form of less handling; greater use of floor space by rearranging equipment and sequence of flow; more effective use of labor and existing equipment; greater safety to personnel; less damage to products; and less waste in materials and time. These improvements are vital to the efficient operation of any business since analyses show that, many times, up to half the costs of manufacturing are attributable to materials handling operations.

Three Steps

Improvement possibilities are inherent in all three parts of every job—make ready, do, and put away. By asking questions with an open mind and consulting those concerned, you may determine that a particular operation does not have to be done at all. From the materials handling standpoint, such elimination is the best improvement.

Questions fall in the general "why" category with the "what, where, when, who and how" approach. In the Burroughs Corp. Work Simplification Handbook, Number 3, explaining the "why" step, the following procedure is suggested:

"What? First, ask what is being done. Ask yourself, first, but be sure to consult others, too. Then, *why* is it being done? Be sure to get the right answer. Get facts; don't be satisfied with opinions. Get real reasons; don't be satisfied with excuses. Does it really have to be done at all?

"Where? Second, ask where it is being done. The answer is usually clear, but it leads naturally to: 'Why it is being done there?' 'Could it be done better some place else?' Remember, keep an open mind; explore possibilities and don't be eager to accept the easy 'no' answers.

"When? Next, ask when it is being done. What is done before it? What is being done then? Could it be done better at some other time? Keep the green light on in your own mind, as well as in the minds of the people who are questioning the job with you.

"Who? Ask who is doing it. Why is that person doing it? Does it tie in logically with the rest of his work? Could someone else do it? Would it be less expensive or easier to have someone else do it? Be sure the people you consult are given a chance to contribute their ideas—and be sure they keep the green light on.

"How? Finally, ask how the detail is being done. What method is being used? Why is it being done that way? Don't accept, 'because we've always done it that way.' Try to believe that there is a better way. If something has been done in a particular way for a long time, that itself may be a tip-off that it can be done better."

In the booklet "Improving Materials Handling in Small Plants,"* questions pertaining specifically to materials handling are listed. For example, these are the questions one might ask in production areas:

Do skilled workers handle materials or heavy dies? That is using expensive labor for an unskilled—and often unnecessary—manual job.

Are delicate parts frequently damaged in transit? Care in handling, plus use of special racks and bins, will go far toward eliminating this endless expense.

Is the production area cluttered with parts and materials waiting to be used—or to be moved to the next operation or discarded? That not only interferes with production, but also invites damage. Live storage conveyors and tiering trays can do a lot to relieve the situation. Better scheduling of materials handling can help, too.

Is every part, pallet load or tote box clearly (and permanently) labeled with tags that show where they have come from and where they are going; to what order they apply; and what special handling is required? That will prevent losses, misdelivery, extra handling.

If you have a multi-story plant, and

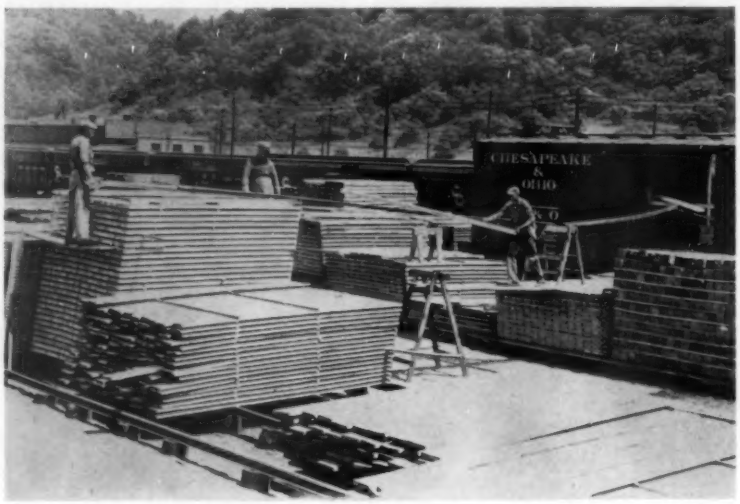


Fig. 1. Here is how the lumber was unloaded from railroad cars at Chesapeake and Ohio's lumber yard before work simplification was applied to their operation

* Small Business Management Series No. 4, is available from the Superintendent of Documents, U. S. Government Printing Office, Washington 25, D. C., twenty cents per copy.

Fig. 2. Before, two people handled job. Now, using holder, job is done by one

elevators are used to move materials between floors, how long do materials handlers have to wait for an elevator? Multiply that figure by the 20 or 50 times a day materials handlers use the elevator, and you will see how much time is being wasted.

How are materials moved from one machine to another, and how are they lifted to working level? If your production area is not sprinkled with small chutes, conveyors, lifting devices, and the like, you are probably losing an opportunity to speed production and cut costs.

Is scrap disposed of mechanically—with conveyors taking it right from the source to storage bins? That can not only save handling costs, but can also safeguard segregation procedures—and bring you a greater return on scrap sales.

Are aisles clear, smoothly paved, and well-lighted so that traffic can flow freely and safely?

Do tote boxes, bar stock, or parts of machines project out into the aisles? At best, they will slow traffic; at worst, constitute a serious safety hazard.

The result of such questioning not only leads to finding solutions that will make materials handling jobs easier and more productive, but also more interesting personally to the individuals involved. Any of the following examples support this statement:

The operation of loading, unloading and stacking of lumber in the Chesapeake and Ohio Railway Co. lumber yard at Huntington, West Virginia, was always time-consuming and costly. R. R. Reynolds, via work simplification principles, made a flow process chart on this job and came up with an improved method. The lumber comes into Huntington from the manufacturer in carload lots. It took five men approximately 16 hours to unload the average car under the old method.

Old method, Fig. 1, included (1) put up scaffold ladders and place boards (so-called skids) along these from the car to the specific stack where lumber will be placed. This runs as much as 75 ft at times. Build a low scaffold (2), if needed, for the man who pushes lumber from car along skid to lumber pile; (3) grease skid so that lumber will slide along it easily.

As can be seen, the makeready on this job is tremendous. After this has been taken care of, (4) two men in the car pick up one or two pieces of lumber, according to size, and place on skid board; (5) third man takes hold of lumber and slides it along skid to proper stack; (6) two men on stack take hold of lumber and place it on stack, while third man walks back to car. (Two men at the car are idle, after placing next board on skid, until the third man returns.) This operation is repeated until car is unloaded. Occasionally cars come in loaded with lumber of several sizes and this necessitates tearing down and rebuilding scaffolding several times.

Through simplification only four men are needed plus an off track crane, that is available: (1) one man picks up lumber in car and hands to two men beside car; (2) two men beside car take lumber and stack it beside them. This is repeated until designated amount of lumber is stacked and then crane picks it up and places in proper position in storage area.

Huntington is the main distribution point for material on the C & O railroad, and it is evident with repeated loadings and unloadings of lumber at this point that the savings of time and money with the new method will be very great.

At Western Printing & Lithographing Co., Racine, Wisconsin, Fred Rogahn, Leonard Bernhardt and Bernie Ruilman brought about less handling by streamlining the assembling of boxed games by combining operations and eliminating nesting, loading and unloading box trucks, hauling and storage.

The old method was as follows: (1) wrap box bottoms, (2) nest, (3) load into box truck, (4) haul box truck to storage, (5) wrap box tops, (6) nest, (7) load into box truck, (8) haul box truck to storage, (9) haul tops from storage to assembling place, (10) haul bottoms to assembling place, (11) unload bottoms from truck onto conveyor belt, (12) fill, (13) unload tops from truck, (14) inspect and close boxes, and (15) pack into cartons.

To eliminate some of these steps, Messrs. Rogahn, Bernhardt and Ruilman arranged two box wrapping machines with a conveyor belt in between. Standard practice now is: (1) wrap box bottoms, (2) drop onto conveyor belt, (3) fill and convey to top wrapping machine, (4) wrap box tops, (5) inspect and close boxes, (6) pack into cartons.

This method was not worked out in one trial. First the conveyor was moved over to one wrapping machine, where the box tops were wrapped at the time of assembling. During this period the question was asked: "Why can't we wrap both tops and bottoms when we fill?" This resulted in elimi-

Fig. 3. Rounded ends of forks simplify pallet alignment for faster handling

nating a lot of makereadies, put-aways, transportation and storages, all of which add costs to a product.

Another example at this plant shows how less handling can be achieved with mail sacks. Formerly a man held the mail sack as a girl string-tied a carton and placed it in the sack. After work simplification a mail bag holder was made, Fig. 2. Now the man string-ties the cartons, places them in the mailbag in the rack and then onto a skid, reducing manpower from two to one, and making the job easier besides.

An example of improved safety, reduction of fatigue, and the better way is found at Copifyer Lithograph Corp., Cleveland. The company has the com-

(Continued on page 156)

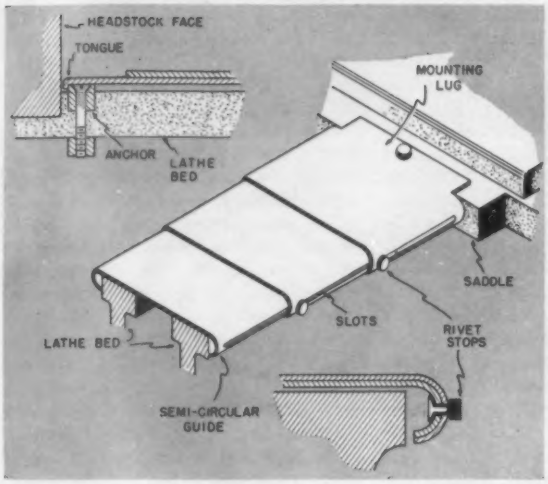


Fig. 1. Telescoping cover in position. Insets show details

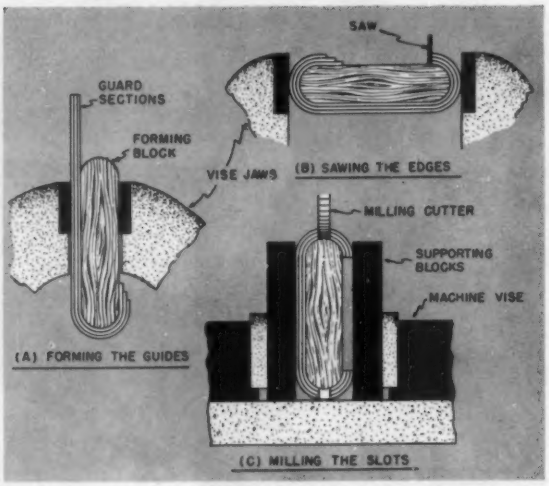


Fig. 2. Procedures for forming sections of sectional cover

How to Construct Telescoping Lathe Bed Covers

By F. E. RILEY, Maintenance and Design Engineer

Highly machined lathe beds are "sitting ducks" for abrasive chips and cuttings . . . Covers fabricated from sheet steel can protect them from damage . . . Author describes fabrication and installation procedures for several types

TOP SURFACES of lathe beds are prone to early deterioration near the headstock because it is in this area that abrasive swarf drops from the cutting tools. A combination of fine swarf particles and lubricating oil is highly abrasive, and despite felt wipers on the ends of the lathe saddles, this mixture often causes the bed slides to be scored. Metal is removed in the short period of six months.

Most lathe operators remember to wipe the fouled bed slides before running the saddle over them and will usually apply some lubricating oil. This wiping and oiling process must be maintained intensively to insure freely moving saddles, but it slows up the operation of the lathe and is frequently neglected.

Maintenance of a lubricating film on the slides, uncontaminated by swarf particles is best achieved by fitting covers over the slides to protect them from dirt and to preserve the lubricating film. Covering the bed is difficult, particularly when the cutting tools are working close to the chuck and the space for accommodation of a guard is limited. By making guards telescopic they can be arranged to fit in the short length between saddle and headstock. When extended, the guards should cover a length of about one foot to the left of the saddle to which they are attached.

The gap bed lathe, used widely in maintenance shops and for general engineering work, lends itself very well to the fitting of telescopic guards.

A telescopic guard suitable for fitting to a gap bed lathe is illustrated in Fig. 1. The left end of the saddle supports one end of the bed cover. The gap width accommodates the guard when collapsed to its shortest length.

Forming the Guards

Each section of the guard is made from a steel sheet, bent to form a semi-circle at each side. The semi-circular sides act as part-tubular guides and enclose the vertical side faces of the bed slides. Stops, in the form of rivets which pass through slots in the semi-circular side pieces, join adjacent guard sections.

As shown in Fig. 1, one end of the first guard section is bent to form a tongue which engages an anchor secured to the lathe bed slides. This is suitable for a flat-bed lathe which has no gap, or for use when the gap is filled with the detachable gap piece. When a permanent gap is available in the lathe bed, no stop is needed since the tongue on the guard section will be anchored by the side of the gap.

When making the guard, the preliminary step is to ascertain the maximum section length which can be used, by measuring the distance between the left hand end of the saddle and the headstock front face, with an average cutting tool set to work close to the chuck jaws. Guard sections will be shorter than this, to allow for the rivet stops and their slot ends, and the fully telescoped guard will have a length equal to one section, plus about ½ in. for each section used.

The first step is to make a wooden form block having a section similar in shape to the inside of the smallest guard section. The block of wood will be of rectangular shape with rounded edges, as in Fig. 2.

Sheet steel sections are laid on top of the wooden form block and gripped in the jaws of a bench vise where they are hammered around the block to produce the half-circular ends. The ends

of the guard sections can be sawed to correct length while still mounted on the form block.

Elongated slots for the stop rivets are machined in a milling machine, using a small diameter cutter.

After milling, the guard can be removed from the form block, the sections separated, the burrs filed off and the whole assembly tried for smooth sliding of the sections within one another. Finally, the rivets are inserted in the slots and their inner ends hammered over, after placing a washer on each and bending it to the internal profile of the guard sections. If all the sections have been made from pieces of the same size and shape, the tongue and the mounting lug may be added by riveting or spot welding them in place on the end sections.

Many engine lathes have guide wings projecting from the left hand side of the saddle and the only way to protect such beds is to make the cover overlap the side wings, including the bed. This results in a cover which is very broad in relation to the lengths of the sections. If an extremely wide guard is made in a similar manner to that illustrated in Fig. 1, the sliding guard sections will tend to jam. To make the guiding surfaces of the guard as narrow as possible, the construction shown in Fig. 3 is recommended.

It will be noted that the guide for the sections is of almost fully-circular section. The procedure for constructing such a guard is somewhat similar to that described earlier, except that a wooden form block will not be necessary. The sections are piled on top of one another as a unit and are bent down the center on a cylindrical mandrel. The circular section is worked around the mandrel by using a bench vise as a bending brake.

Rivet stops working in elongated slots milled through the wall of the central tubular guide are used to prevent the sections from pulling apart in use. The two end sections are secured to the saddle and the headstock by bent lugs which may be integral with the sections or separate pieces fastened on.

It may appear that this guard would tend to jam in use because the open gap in the top, formed by the tubular guide, would act as a swarf trap, but in actual use, no trouble has been experienced. Small particles tend to drop through the bottom elongated slots and large chips tend to ride on top of the cover.

Provisions for Removal

Both the guards described have the virtue of being removable quickly, should their use impede the working of the lathe. For example, when working with collets, the saddle is brought close to the headstock and there may not be space available for accommodation of the collapsed guard. In such circumstances, the guard may be removed, since the slides will be fairly well protected by the saddle. For most of the work done by a general-purpose lathe, the guards can stay in place and not interfere with the operation.

The V-section lathe bed, often known as the prismatic section bed, is one of the easiest to equip with permanent swarf covers. In the example shown in Fig. 4, the guard consists of a length of aluminum angle secured to the lathe saddle. Most prismatic section beds have slides which extend along each side of the headstock gear box so that a useful length of the cover can be accommodated. Such covers may also be made of sheet steel and arranged to telescope by adopting the techniques illustrated for protecting flat lathe bed ways.

To prevent the overhanging end of the guard from dragging along the top surface of the bed slides, fibre or hard rubber plugs are installed with their enlarged heads bearing on the actual slide surface. The angle-section guard can be secured to the wings of the lathe saddle over the top of the existing felt wiper covers with a mounting lug, as shown in Fig. 4.

Probably the most precise component on the average lathe is the lead-screw, yet it is usually exposed to swarf and gritty particles which adhere to the thread grooves and are very difficult to dislodge. When the lead screw is positioned fairly close to the lathe slides it can be protected by modification of any of the bed protectors described. The downward projecting side pieces on the guards can be extended so that they enclose the screw. It is often possible to fit a non-extending tubular or U-shaped lead-screw cover to the left hand side of the lathe apron. Where a screw-cutting gear-box would interfere with the movement of a lengthy lead screw guard, it can be made from sheet metal and arranged to telescope by adopting any of the construction methods described in this article.

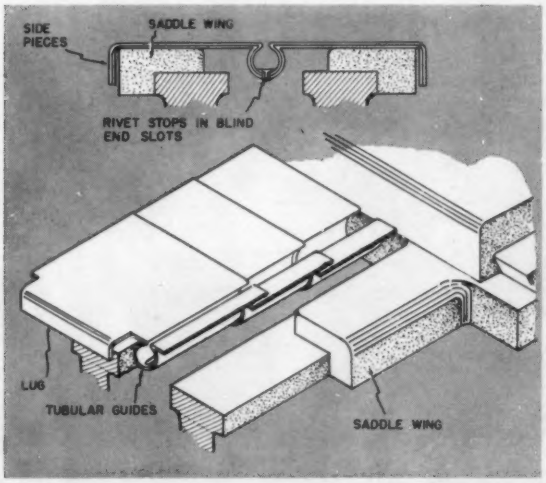


Fig. 3. Special design cover for wide-span applications

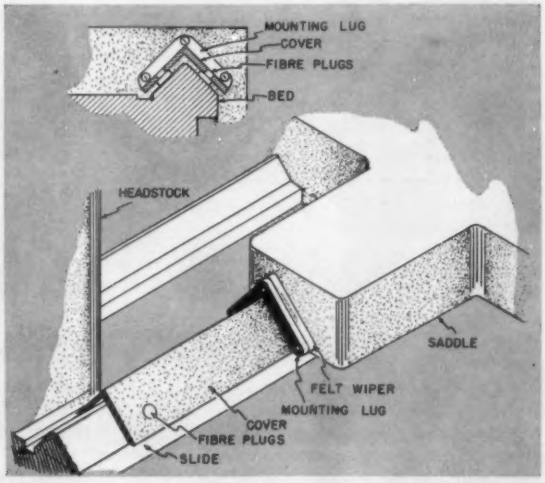


Fig. 4. Aluminum angle serves as cover for v-shaped ways

Outgoing president of the Chicago Plant Engineers' Society, Homer Zoeter, Continental Can Co., center, poses with Fred Leason, left, the newly elected vice president, and Arnold Lamb, American Brake Shoe Co., senior board member

Activities of the Plant Engineers' Societies

AS THE NUMBER of Plant Engineers' Societies increases so will their activities. Following is a brief report of what some of these Societies are doing:

Chicago

The Plant Engineers' Society of Chicago had two of its own members speak on the subject "Definition and Scope of a Plant Engineer."

The speakers were Ted Ramond, of Goodman Manufacturing Co., and John Balla, of Western Felt Co. Ted Ramond discussed the plight of the plant engineer when seeking a new position, and the difficulty that exists when it comes to the question of salary and qualifications. It seems that the qualifications an employer sets down when looking for a vice president or manager are concrete and no problem exists. However, Ted felt that this was not so in the case of a plant engineer. The employer may be looking for a man to do a number of jobs but in many cases he does not have it set down by title or function or have a definite salary in mind. This is something Ted hopes can be corrected in the future.

John Balla projected the responsibilities of the plant engineer, pointing out that automation along with an increase in the use of specialized equipment will add many more responsibilities upon the plant engineer.

The results of their recent mail ballot were announced at this meeting: M. T. Anderson, of Illinois Tool Works, is the new president; Fred Leason, Interstate Bakeries, is the new vice president; George Glos, Pettibone Mulliken, will serve as Junior Board Member; and K. N. Banthin, The Visking Corp., takes on the duties of secretary-treasurer for another year.

New York

An effort to cover quite a number of subjects in one night was recently attempted by the Plant Engineers' Association of New York.

Among the list of fourteen items, they were going to tackle such subjects as: estimating replacements, improvements and renovations; how do you clean out an ammonia system to remove collected oil and sludge?; planning for sanitation in large plants; preventive maintenance planning and scheduling; steam condensate corrosion; water hammer in condensate lines; and inspection and scheduling systems to keep buildings in good repair.

Cincinnati

At the second meeting of the newly organized Plant Engineers' Society of Cincinnati, the following officers were elected:

F. C. Olds, Procter & Gamble Co., was elected president; H. F. Borger, Hilton Davis Chemical Co., takes over the duties of vice president; and R. G. Flohr, The Kroger Co., will handle the job of secretary-treasurer.

Twin City

A combined business and social meeting was held by the Twin City Plant Engineers' Society. Members and their wives enjoyed a pleasant meal, followed by a talk and films on the subject "Safety in Industry and in the Home," presented by Mr. Frank Shea of the Aetna Casualty & Surety Co.

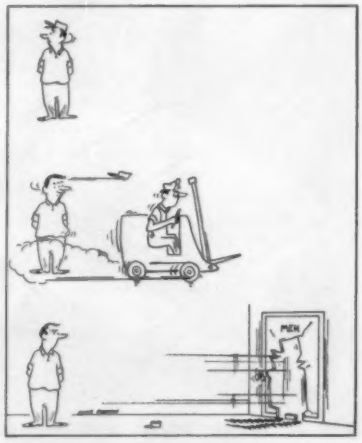
The new officers, elected by mail ballot, are: A. C. Born, Northern Ordnance Co., president; K. F. Johnson, Pillsbury Mills, Inc., vice president; E. H. Nollan, Straus Knitting Mills, treasurer; and M. J. Frisch, Waldorf Paper Products Co., secretary.

During the past year the Twin City Plant Engineers' Society scheduled a number of interesting programs. One session was on floor maintenance. This consisted of a panel and group discussion. Another session was on electric motors and their application. Other subjects were on roofing construction, maintenance stores and store keeping, exhaust hoods, work measurement, and preventive maintenance. One plant tour was also planned for the past year at the Hamm Brewing Co.

Mohawk-Hudson

We recently received word that the Mohawk-Hudson Plant Engineers' Society has adopted a Constitution. If other societies would be interested in seeing a copy of it, they should direct their request to the Secretary, Charles W. Felter, 347 Ninth St., Troy, N. Y.

In order to cause minimum interference with the business activities of the chapter, the secretary and treasurer serve two-year terms, while the president's and vice president's terms are limited to one year.



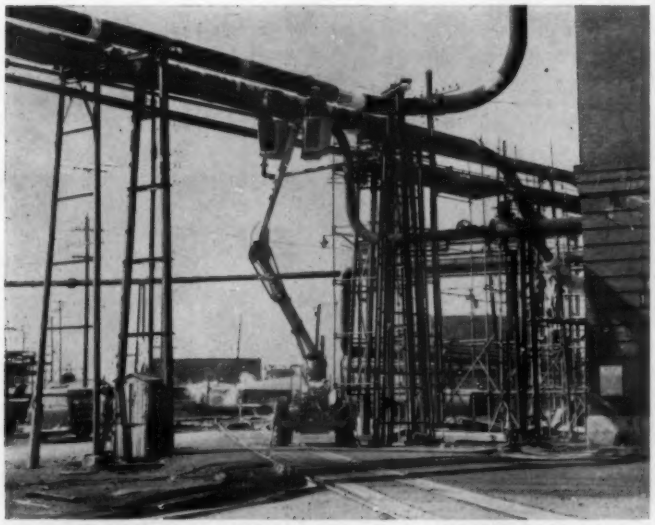
Maintenance Jack-of-All-Trades

High-level installation and maintenance work, earth auger operation, for use where scaffolding is impractical; these are some jobs that can be done with the Sky-Worker

Versatility of the equipment is exemplified in this photo. Here, an earth auger suspended from the Sky-Worker's modified boom digs a hole into which the unit later will set a 55-ft utility pole

The use of the unit in shipyards has materially reduced time and labor in accomplishing work formerly performed by the use of conventional staging and hanging scaffolding. One job performed by the Navy, using equipment, required 475 man-days as opposed to former 775 man-days

For in-plant maintenance work of all kinds the unit may be mounted on a trailer, tractor or dolly. Advantages are its portability and safety



Quickly positioned for emergency repairs such as this one, the equipment's mobility enables the elevation of men, materials and tools to a comfortable height while permitting routine plant operations to continue

Airborne Pittsburgh Plant Engineers—

Inspect Facilities of Wright Air Development Center

ON A SUNNY morning in June, members of the Pittsburgh Plant Engineers' Association descended on the airfield of Wright Air Development Center in two C-119's, otherwise known as "Flying Boxcars." Their principal mission was to learn something about the operations of men and equipment helping not only to keep the Air Force strong but make it better.

One of the visiting aircraft was piloted by Major Arthur Fitzpatrick of the 2253rd Air Reserve Flying Center; he was highly instrumental in making this trip to the Center possible. Lt. James B. Tafel of the same unit and an associate member of the Club also took part in the arrangements.

Shortly after arrival, the flying engineers met in a small conference room where several speakers addressed the group. One of these was affable Air Force Colonel W. T. Clement who was in charge of the group during the tour and the day's activities at the huge Air Force base. One of the points of interest where the plant engineers stopped was the Structures Test Building. Here air frames are subjected to strains and stresses until failure occurs. During the visit, a model was used to demonstrate deflection testing on aircraft wings. These were loaded with weights and were moved up and down with the aid of hydraulic cylinders. At the rocket test stand, the drama of a miniature atomic explosion was enacted for the group. While standing at a distance from a concrete structure equipped with a sliding roof, the engineers listened to a "countdown" and saw the firing of a Jato unit used in aiding heavy jet aircraft on take off.

Even though the jet age is here, there are still many propellers in use. With the coming of the turbo-prop engine they get an extension in their useful life. The Center continues to test propellers on huge whirl rigs which the group saw. One of these is equipped with a 30,000 hp motor.

An opportunity to see close-hand the operation of a turbo-prop engine was one of the highlights of the visit. Members had a chance to inspect the engine after it was brought to a stop and to look over the instrumentation in the control room.

Fig. 2. Dressed in flying suits and wearing parachutes, some of the Pittsburgh Association members are seen inside one of the "Flying Boxcars"

Fig. 3. Around wind tunnel test model are: F. C. Williams, club president; E. B. Skubik, Plant Engineering; Col. W. T. Clement; Maj. A. Fitzpatrick

Pittsburgh Papers Publicized the Dayton Trip. This Article Appeared in the Sun-Telegraph

Really good local publicity such as this is obtainable only if the local society's publicity committee and chairman put on a concerted drive to alert local papers of the organization's outstanding activities. It always helps, too, to invite a reporter to go along on the trip.

Visitors See What Makes Plane Forces Click

ive 24 District Plant Engineers Tour Big Dayton Air Base

By JACK WARD

Two dozen plant engineers from Pittsburgh district industry this week were given a look at the astounding research, test and development center that keeps the U. S. Air Force at the top of the heap.

The group, members of the Plant Engineers Association, toured the Wright Air Development Center at Wright-Patterson Air Force Base, Dayton, O., as guests of Pittsburgh's 2253rd Air Reserve Flying Center.

Escorted and flown there by Maj. Arthur Fitzpatrick, CO of the 2253rd, in two C-119 troop transports, the engineers were briefed by lectures and actual demonstrations in many of the unique problems and projects which will produce the Air Force of tomorrow.

The tour included visits to the vast center's laboratories and test centers where everything from a rivet to a gigantic intercontinental jet bomber are planned, developed, tested and improved. WADC projects touch on every phase of building, maintaining, supporting and equipping an effective Air Force—including the human factor.

In their visit to the center's engineering shops, the plant engineers were shown the vast array of intricate, specialized machinery by which ideas are transformed into the substance and shape which someday may be hailed as an aeronautical advancement.

In the huge Structures Test Bldg., which can accommodate a B-36 intercontinental bomber with four feet to spare, they were shown the facilities by which complete aircraft are put through the wringer and "tested to destruction" to learn the limits of their capabilities. Under structural tests at the time were an F-84 jet fighter and a twin-rotor "flying Banana" helicopter.

Under assembly for forthcoming tests was one of the Air Force's newest fighter planes, the weird looking F-102. An official explained that the center WADC obtains three models of each Air Force plane under test—one to fly, one to test to destruction, and one to "cannabilize" for parts to test separately.

In another building, the visitors were shown how tires, brakes and landing assemblies are tested on a gigantic inertia flywheel which reproduces exactly the landing jar and roll of the aircraft involved.

And, in a vertical wind tunnel, they watched as a scale model plane was tested for spin and spin recovery characteristics. In the same tunnel, they were shown with a model resembling a large thread spool how research is conducted to develop more efficient bomb shapes.

They also visited the Air Institute of Technology, where scientists delve into the field of pure aeronautics and where students, by performing practical research, earn professional degrees.

Later, the visitors watched a firing demonstration of a new smokeless rocket used to assist jet aircraft in takeoff.

The windup of the tour left the engineers gasping with a close-up view of the Air Force's newest weapon, the eight-jet B-52 which can deliver its bomb load on any target on earth, and which a few years ago was one of WADC's "planes of tomorrow".

AT CONTROLS . . . Francis C. Williams, son of the late Sun-Telegraph Photographer Burt Williams, tries his hand at controls of C-119 en route to Dayton. Williams is assistant plant engineer at Dravo and president of the Plant Engineers Association of Pittsburgh.

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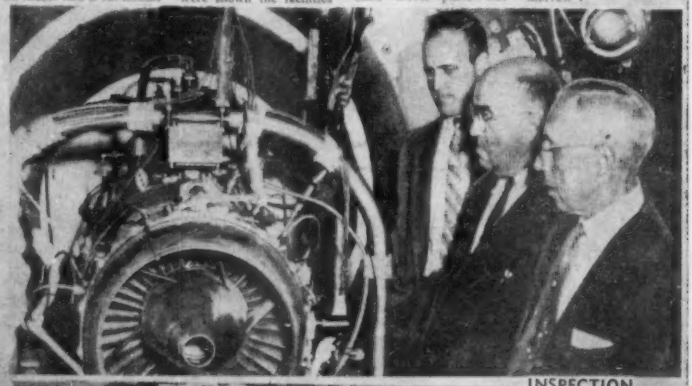
Sun-Telegraph Photo by Earl McCartney



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Sun-Telegraph Photo

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INSPECTION . . . Donald A. Bennett, Westinghouse Air Brake Co.; Theodore J. Bieber, Union Switch & Signal; Charles A. Wedge, Mine Safety Appliances Co. (left to right), inspect turbo-prop engine in special test chamber which can be refrigerated to —120 F. to learn cold weather operating characteristics of engine.

SCALE MODELS . . . Plant engineers are shown as they inspected exact scale models used to obtain flight data on the real things in wind tunnel tests.

Fig. 1. This legend over the main entrance of the Camp Manufacturing Plant in Franklin, Va., sets the keynote for an energetic safety program which has reduced the accident rate ten-fold

Safety Really Comes First at Camp

SAFETY, AND THE utilization of individualized safety equipment, is paying off rich dividends in the form of a greatly decreased accident frequency rate at the Camp Manufacturing Company, in Franklin, Virginia.

An ambitious safety program had lowered this frequency rate tenfold when this was written. The 1953 figures show a drop of 86 per cent over those of 1951.

Holding that figure is no easy task in a paper mill which produces about 1200 ft of paper products per minute. Camp's paper division makes high grade kraft paper, white paper, corrugated paper boards, and other paper products. The company's raw product comes from the timberlands of Virginia and neighboring North Carolina, to the 26-acre plant at Franklin.

Much of the credit for this improvement in safety conditions can be attributed to F. B. Lowe, who established two goals for himself when he became company safety director in 1952. He set out to procure "the best types of safety equipment available." To him this meant equipment which could be simply operated by all of the plant's more than 1,000-man work force, but which also would give his safety program maximum effectiveness.

One of the chief safety problems at the Franklin plant is the possibility of leaks in chlorine pipelines in the Paper Division's bleaching plant. This threat to worker safety is remedied to a great extent by the ultramodern design of the structure. All chemical pipelines are exposed to open air for gas dispersal. Forced air duct ventilation is provided for the operating floor. And gases are forced through a roof stack by means of an exhaust system.

An additional danger spot is the loading platform, where railway tank cars carrying liquid chlorine are coupled to plant feeder lines. A revolving red blinker light warns of the presence of dangerous gases if a leak occurs at this point.

To combat the menace of chlorine, the company has procured safety equipment meeting director Lowe's rigid requirements for all plant personnel. Twenty-seven different types of protective and first-aid devices, all manufactured by The Mine Safety Appliances Company, Pittsburgh, have been placed strategically throughout the plant.

Gas masks have been provided for each worker in the vicinity of the chlorine lines. Quickly fitted and re-

quiring no special training for use, these masks afford complete protection to workers from the effects of chlorine until maintenance crews plug the leaks. Widely used in industry, these masks contain chemical canisters which absorb or render harmless most poisonous gases and smoke.

Also available for use of Camp personnel, especially those doing actual repair work on leaky pipes, are oxygen breathing apparatus. These devices afford complete respiratory protection for a minimum of 45 minutes of hard work. They generate their own oxygen supply upon contact with the moisture in the wearer's exhaled breath and remove the exhaled carbon dioxide. The apparatus can be used in any atmosphere, regardless of oxygen deficiencies.

Emergency Equipment

One of the first pieces of equipment chosen by Mr. Lowe was the Pneolator, an automatic artificial respiration instrument which requires no manual assistance. An auxiliary attachment allows simultaneous treatment of two victims.

Lightweight and portable, the Pneolator can be quickly rushed to the side of the victim. It intermittently inflates the lungs to a predetermined point, then cuts off the pressure and permits exhalation by the natural recoil of the chest and diaphragm. This process induces voluntary breathing. When the patient has been revived and begins to breathe naturally, the Pneolator provides additional oxygen, to make his breathing easier. The application of intermittent positive pressure as accomplished by the Pneolator is particularly effective if pulmonary edema induced by irritant gas inhalation should be present.

Dust excluding respirators protect Camp Manufacturing personnel at the plant lime kiln and in the unloading of lime from box cars. Fitting closely over the nose and mouth of the wearer, the mask's static-web filter bars inhalation of lime and other particulate matter.

The plant is also equipped with a combustible gas indicator which requires only a few minutes to sample and test vapor-in-air mixtures for explosibility. A model of this device was specially prepared for Camp to test for pockets of turpentine and petroleum gases.

According to Mr. Lowe, this indicator also creates a greater degree of assurance among workers. "Employees," he says, "seeing the safety director on his rounds with the indicator, know that new tests for their safety are being made."

(Continued on page 184)

Fig. 2. Men repairing a leak at Camp are protected by gas masks which permit normal breathing in the presence of most of the usually dangerous industrial gases

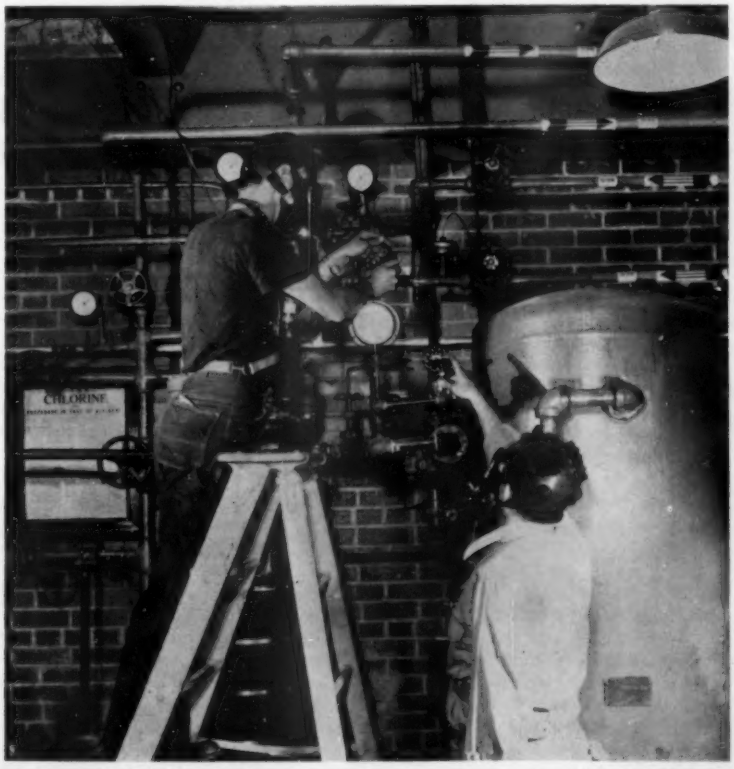


Fig 3. Oxygen breathing apparatus is donned by workmen when leaks occur in piping carrying liquid chlorine from tank car into Camp Mfg. Co. bleach plant

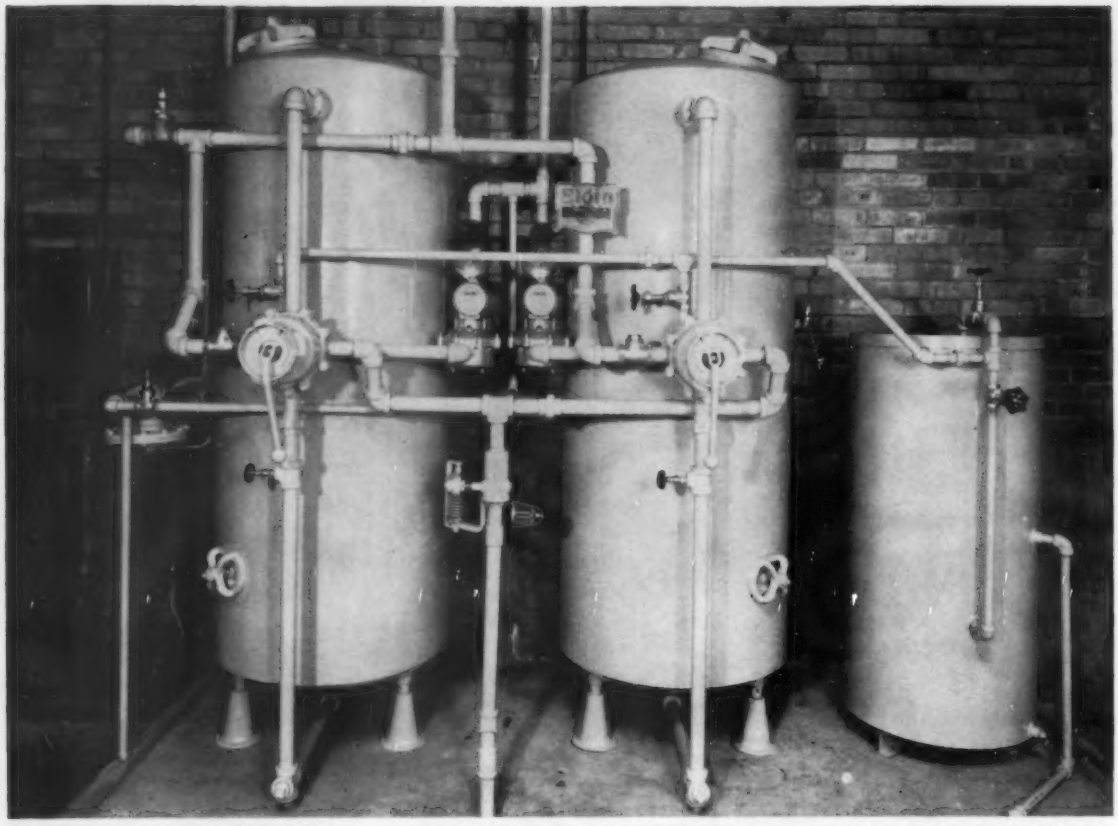


Fig. 1. Conventional unit for softening boiler feedwater. Double unit greensand Zeolite softener, multiport valve control

Water Softening Methods

Each Has Its Advantages—and Its Limitations

CHEMICAL COMPOSITION of the raw water to be treated, rather than the softening cost, should always be the main consideration in the planning of water treatment systems. Softener selection should be governed by: the final softener effluent; the water behavior while in boilers and other process equipment; and the reduction of corrosion in the entire system.

Removal of suspended solids is the first step in every water treatment program. In many plants this is incidental, since the raw water supply is obtained from municipal or well sources which are clean and fully clarified. A sedimentation effect is often automatically obtained in a plant, where operating and auxiliary water storage tanks permit the water to remain still, and be routinely switched from one unit to another.

This simple plan is most economical for low turbidity waters but a settling period over 24 hours is rated maximum. A longer time is not warranted, since solids removal will never be entirely complete and must be augmented by an additional scavenging process to reduce remaining suspended solids.

Unless adequate soft water storage is available, size of water softening equipment required for boiler feedwater makeup should be calculated on the highest peak rate rather than on average flow rate. Otherwise, the softening equipment will be overloaded during peaks and produce poor quality water.

External softening and water treatment can be classified under several basic processes.

Sodium Ion Exchange. The Zeolite softener became commercially successful in 1907. Since 1941, with the introduction of higher exchange capacity resins, zeolite softening has become recognized as the most efficient and economical method for producing soft water.

These are simple base-exchange reactions where hardness-forming calcium and magnesium salts are directly exchanged for non-hardness-forming sodium salts.

Every zeolite is an imperfectly bound chemical compound protecting its original composition so that it changes chemically depending on the concentration of compounds in the raw water being softened. This inherent chemical construction is designed so that the sodium radical of the zeolite interchanges in any direction for calcium and magnesium.

Especially valuable in a zeolite is high operating exchange capacity, which reduces equipment size. Zeolites should also be suited for the raw water being treated, should have an operating range of 6.5 to 8.2 pH and be kept at an operating temperature below 150 F.

Generally, about five per cent of the zeolite will disintegrate and wash away annually. The entire zeolite bed should be thoroughly flushed every

three months with chlorinated water to destroy bacterial growths. It is good practice never to leave a regenerated softener full of water for more than ten hours without use. When a softener is not recycled and used within a week's time, the zeolite should be left unregenerated and the unit completely drained. It will be found that zeolite exchange capacity will be improved by never back-washing with water harder than 10 grains (171 ppm). If the raw water is harder, it should be equalized below 10-grain hardness, by-passing soft water from the auxiliary operating zeolite softener.

Although flow of raw water through a zeolite bed may be either upward or downward, downward flow is more common since there is less danger of carrying zeolite out with the effluent, and improved bed filtering action is achieved.

Loss of softening capacity of zeolite systems is often traced to: the physical condition of the zeolite; flow rate through the softener bed; lack of sufficient salt regenerant; lack of uniform distribution of brine during regeneration. With all types of zeolites, it has never been found that running the softener to exhaustion before regeneration has had any bad effects.

Anthracite coal should be used in place of both sand and gravel in filter beds. The anthracite should be clean and free of long, thin and scaly pieces, have a hardness of 3.75 on the Moh scale, and have a specific gravity not less than 1.55. Unlike sand, anthracite coal will not add silica to alkaline water and because of the lower specific gravity of coal, lower and more economical back-wash rates may be employed.

With the conventional zeolite exchange, sodium is the exchangeable cation. There is no reduction in dissolved solids since the sodium replaces calcium and magnesium. The resulting sodium bicarbonate alkalinity formed is undesirable in all boiler water, but suitable for most industrial soft water requirements.

Substituting hydrogen for sodium as the exchange medium produces a water with lowered alkalinity and greatly reduced total solids. However, with hydrogen softening, a resinous exchange material is required due to the higher capacity necessary in removing heavy metallic salts.

Regeneration with sulphuric or hydrochloric acid changes the cations for hydrogen and the calcium, magnesium and sodium all become acids. Carbonic acid is produced, but being unstable, forms carbon dioxide which is aerated and removed. The mineral acids are then neutralized with an alkali such as caustic soda or soda ash.

Table I. Overall efficiency comparison shows the advantages of dealkalization

	Hard ness	M Alka- linity	CO_2 in Steam
	parts per million		
Original raw water	130	115	
Hot Process Softened	20	15	14
Sodium Zeolite with Acid	2	15	11
Sodium Hydrogen Zeolite	2	15	11
Dealkalization	2	5	3

Dealkalization by chloride anion exchange is a late development where the raw water is softened and chloride is substituted for the raw water alkalinity content. A strongly basic resin is employed with sodium chloride the regenerant. Since these resins convert to chlorides and split salts, exchanging their chlorides for bicarbonates, sulfates and nitrates, the process is not efficient or economical with high sulfate waters. However, since most waters that are high in bicarbonates are usually low in sulfates, this process is attractive from cost standpoint.

The dealkalization process offers advantages that include the avoidance of acid storage, handling and special equipment problems; elimination of aeration and operation under regular system pressure, with no repumping.

Demineralization. Sodium and hydrogen zeolites are cation exchangers where one cation replaces another. Using a zeolite that exchanges anions in a combination of both types, dissolved salts can be completely removed providing an effluent which is practically the same as distilled water. Distillation can be purposely omitted, with modern demineralization methods.

Lime-soda softening. Whether cold-lime, cold-lime soda, cold-lime zeolite, cold-lime barium, hot-lime-soda, hot-lime zeolite, with a variety of operating and design details, the softening principles remain the same. When calcium hydroxide and sodium carbonate are added to the water, calcium hydroxide reacts with calcium and magnesium bicarbonates, precipitating them as calcium carbonate and magnesium hydroxide. Other soluble calcium compounds are converted by sodium carbonate to calcium carbonate and the corresponding sodium salt.

Soluble magnesium salts are removed by the combined reaction with lime and sodium carbonate, the magnesium being converted to the insoluble hydroxide.

Supplementary chemical treatment is always desirable with lime-soda softening. Iron and aluminum compounds will aid in settling finely divided precipitates by forming gelatinous hydroxides. Sodium aluminate hydrolizes to form aluminum hydroxide (an efficient flocculating agent) and sodium hydroxide. It will precipitate the magnesium as the aluminate, and coagulates a considerable part of silica as magnesium alumino-silicate while the sodium hydroxide acts with calcium hydroxide as an additional softening agent. Sodium carbonate formed reacts with non-carbonate salts.

Addition of magnesium salts reduces silica under controlled temperature and alkalinity. A part mechanical and chemical process, magnesium hydroxide is formed by the hydroxide alkalinity and the magnesium salt used and acts by absorption. Ferric hydroxide formed by various iron salts also aids in silica removal.

Phosphoric acid or phosphate salts

Ion Exchange

1. Free from sludge.
2. Low first cost and operating costs.
3. Free from danger of excess chemicals in effluent.
4. No distribution system deposits.
5. Any hardness reduction is obtainable.
6. Virtually complete removal of silica.
7. Pre-pumping is unnecessary.
8. Small space, nearly automatic, highly skilled labor unnecessary.
9. Independent of change in raw water supply.

Lime-Soda

1. Suitable for turbid and acid waters where zeolite cannot be used.
2. Effluent contains lower total solids than zeolite systems.
3. Corrosion prevention is simple and easily installed in existing filter plant.
4. May be more economical, and free from disintegration of material.
5. Has bactericidal effect.
6. Effective for excessive hardness and high sodium content.

added after lime-soda remove residual calcium and magnesium salts. The phosphate reaction should be entirely complete and the final effluent filtered before being used as boiler feed to reduce feed line sludge deposits.

As water softener reactions follow chemical reaction velocity which is accelerated with temperature rise, sulfate reactions are completed in less than ten minutes at 205 F—while with 70 F water, they are not complete after five hours. It therefore follows that residual scale-forming solids from hot process treated water are lower than with cold-process treated water.

Greater economy and more efficient results will be obtained with lime-soda softening by the use of excess lime; use of aluminum or ferrous compounds; sludge recirculation; and combining lime-soda process with zeolite softening.

Addition of 34 to 52 ppm excess lime followed by sufficient soda ash will cause a reaction with non-carbonate hardness and the excess lime will completely precipitate magnesium. Excess lime can be determined by a phenolphthalein test. If P alkalinity is equal to one-half M alkalinity, only normal carbonate alkalinity is present. If P alkalinity is greater than one-half M alkalinity, excess caustic alkalinity and lime is indicated.

Hot-lime zeolite process today is replacing other more costly treatment methods. This system produces an excellent effluent; has demonstrated relative lack of deterioration of styrene ion-exchange resins; has a low operating cost.

With all softening systems, operators should run hardness and control tests at frequent intervals, because water conditions can change rapidly and require treatment adjustments.

Changing plant process requirements require a thorough study of all present and future water applications, considering operating costs and capital investment. With the use of all types of ion exchange equipment, the additional cost of neutralization of back-wash waters must be considered, since lime or soda ash must be added to acid softener wastes. Salt brines can be diluted with other plant waste waters to comply with local and state health requirements.

Developments that offer considerable promise in the treatment of plant water are membrane systems used with electric currents which separate salts from water by an "electrical ion exchange." While now designed for producing large quantities of fresh water from salt water, this method can conceivably be perfected for complete ion exchange. The synthetic membranes are composed of low cost coal, tar and chemical compounds, and while not entirely identical, are modeled after the different purifying membranes of the human body.

When pumped through this equipment, sea water containing about 3½ per cent salts, has a final effluent of about 67 per cent suitable process water and the remainder brine. It is possible to recover salts of potassium, bromine, and magnesium from the brine.

Electric power cost approximates six cents per 1,000 gal and complete cost including amortization of equipment would range between 10 and 20 cents per 1000 gal treated.

Table II. Average concentrations in water after various softening treatments

	Raw Water	Cold Lime Soda	Hot Lime Soda	Hot L-S with Phosphate	Sodium Zeolite	Hydrogen Zeolite	2-Bed Demineralizer
Total Hardness	170	65	20	5	5	5	3
Alkalinity	115	95	45	45	120	2	5
Chlorides & Sulphates	55	65	55	55	65	70	6

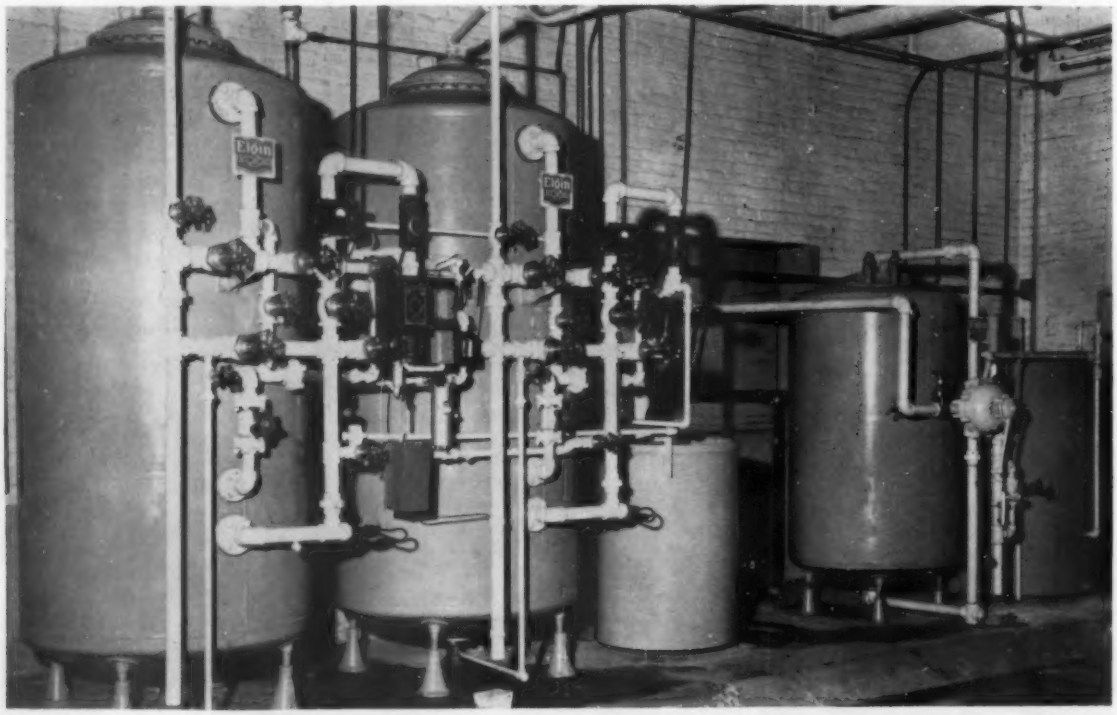


Fig. 2. Demineralizing units, operating in tandem. Each unit is four feet in diameter. Companion softener stands at right

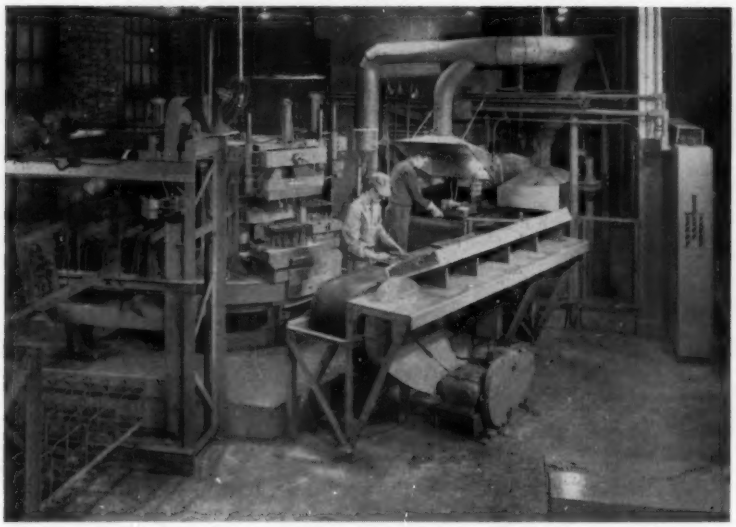


Fig. 1. This is the heart of the compact shell molding system. The four-station shell molding machine is in the background, the core setting conveyor and shell closing machine are in the center, the mechanized shell storage conveyor is at left and push-button control station, right. System can handle 240 molds an hour

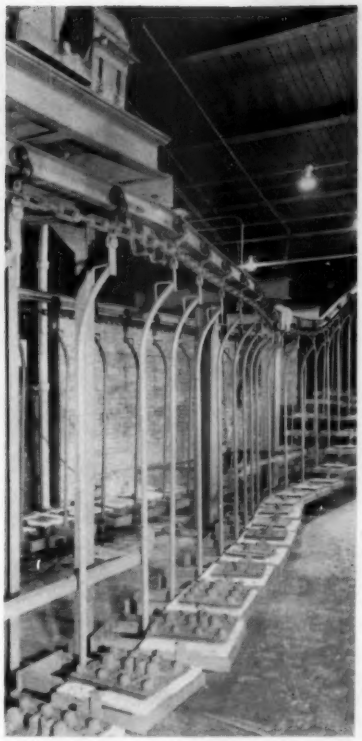


Fig. 2. Shell molds begin trip to the pouring station at the Ewart foundry

Shell Molding

Moves Step Closer to Automatic Foundry

FOUNDRIES OF THE future could very well be based on this fully integrated shell molding system which is capable of handling 240 molds per hour at Link-Belt's Ewart plant in Indianapolis.

The shells are prepared on a four-station shell molding machine developed by Link-Belt in collaboration with and under patents acquired from the Walworth Co. of New York.

Shells are formed by dropping or "investing" on a heated metal pattern a measured volume of mix consisting of thermo-setting resin and sand. A flask confines the sand and resin over the pattern, while water cooling prevents build-up on the inside surface of the flask.

Excess sand mix is removed by a roll-over motion, the flask is then withdrawn, and the pattern with its soft plastic shell covering, moves to two successive curing stations, where the desired hardness is obtained.

The thin shell is removed by the operator at the ejector station, and the pattern is then sprayed with a release agent to facilitate shell removal. After this, it again passes to the investment station. It is possible to make a shell every 15 seconds.

As shells are removed from the molding machine, cores are set and the drag half is placed on a fixture in the closing machine. Adhesive is then applied around the mold cavity. The cope half is put in place, and the air-operated mechanism holds the two halves together while the adhesive sets. Close tolerances between the cope and drag eliminate objectionable fins in the finished casting.

After this operation, the shells are placed on a trolley conveyor for pouring. Small castings which are poured horizontally normally require no support. Sand, gravel or shot can be used to support the shell, if necessary.

The use of shells permits a virtually dustless shakeout of castings. Waste sand and cores are quickly disposed of, in contrast to the large volume of hot sand which must be handled and reclaimed in a conventional system.

As you can see from the illustration Fig. 1, the shell molding system can be laid out compactly and fitted into limited space. This flexibility permits economies in the arrangement of sand preparation equipment, molding and closing machines, storage, pouring and shakeout conveyors.

This complete shell molding and pouring system was designed and built by Link-Belt Co.

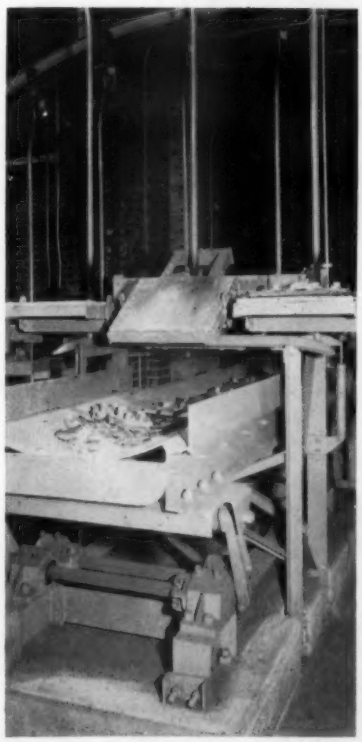


Fig. 3. Air-operated mechanism trips pallet to dump shell mold and casting

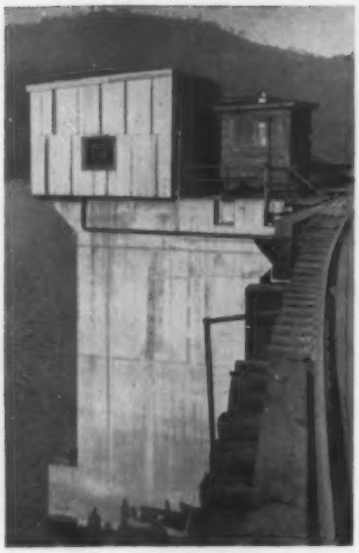


Fig. 1. Pittsburgh Steel intake screens water on way to the suction chamber

Shoreline Construction

II—Pump Houses and Intakes

Author points out five principal factors to consider when planning a pump house . . .Design and engineering particulars are discussed along with a description of several projects

By C. W. GRANACHER, Project Engineer
Contracting Division, Dravo Corporation

ALL INDUSTRIAL PLANTS need water. These needs vary from drinking water and simple sanitary facilities for a small plant, to millions of gallons per day needed by a steel mill or a steam generating station.

The water requirements, when small, are usually met by purchasing this commodity from water companies or municipalities or by pumping it from company-owned wells. However, it is seldom found that either of these sources will prove economical when considering the large water needs of many of our plants and industries, particularly chemical, oil and coal companies, public utilities, steel mills and the like. A pump house is as important to these plants as the heart is to the human body; without circulation there is no life.

While pump houses vary in appearance, they all have one purpose in common: to furnish a dependable source of water. To accomplish this purpose, they naturally are located at or near the shoreline of rivers, canals or lakes.

The principal factors to be considered in planning a pump house or intake include:

1. Pumps, number and type. Gravity flow will require an intake only.
2. Screening equipment and chemical treatment facilities. This will depend on quality of water needed.
3. Structure. Size and shape is determined by equipment to be installed with adequate provision for future expansion.
4. River stages to be expected. Water must be available at all times.
5. Foundation conditions.

While a large number of pump houses have been built for reciprocating pumps, the higher efficiencies of the rotary type pump almost always dictate their present day use. Although there is controversy regarding the relative merits of horizontal versus vertical pumps, this article is not concerned with the argument. It may be said that a well-engineered pump house can accommodate either type. Most plant engineers will have their preferences for one or the other.

The number and size of pumps, however, require a great deal of study. It is very desirable to figure on obtaining the maximum volume of water needed through the use of only part of the pumps installed. This leaves a spare pump or pumps available to maintain required output during repair and maintenance operations.

Pump Elevations

Horizontal pumps can be set at an elevation below or above the normal water level. The first location will produce a pressure head of water on the pump suction line, while the second requires a priming system. Vertical pumps are set with the impeller and housing below water level. The layout of pumps naturally should be so arranged that all are readily available for service, repairs or replacement. The piping should contain enough valves to isolate each pump when necessary.

The screening equipment to be installed depends entirely on the proposed use of the water. Almost always bar screens are needed to eliminate large debris. Often, behind these are traveling water screens to eliminate leaves, twigs, fish and other small sized material. If even cleaner water is required, rotary water strainers can be installed to remove the very fine materials that pass through the traveling water screens.

Chemical treatment also depends entirely on the ultimate use of the water. Extensive settling and coagulating basins usually would be built separate from the pump house, if needed, but frequently the addition of lime to control acidity is made at the pump house.

The pump house itself and its location are most worthy of consideration. The structure must be built and located so the pump suctions are always immersed at low water stages. It must be designed structurally to withstand the hydrostatic head it will be subjected to at high water stages. It also must be heavy enough to resist flotation at flood stage. A pump house must have a firm foundation so it will not settle and cause breaking of the water pipe lines, structural distress and failure, or mis-alignment of equipment. Ofen this requires that the structure be supported on bed rock, either by direct contact or the use of bearing piles.

There is no way in which you can buy a pump house over a counter or from a warehouse. Each one must be designed and engineered to serve a particular use at a specific location. A description of actual projects will bear this out.

One example is the pump house built for Jones & Laughlin Steel Corp. at its Pittsburgh Works in 1951. It

is located on the south bank of the Monongahela River at the foot of 34th Street. The reinforced concrete substructure is 146 ft long by 45 ft wide and extends from 16 ft below normal pool to 33 ft above pool. An intake forebay is provided which extends 12 ft riverward of the main structure. The superstructure is of concrete block construction, 22 ft high, with steel columns supporting a 15-ton traveling overhead crane and steel roof trusses. The roofing is of corrugated asbestos.

Since rock was about 45 ft below pool, and the river bank material was clay and mud, 14-in., 89-lb steel bearing piles, driven to rock, were used to support the weight of the structure. Because it was built on a sloping river bank, the front or riverward row of piles were battered to resist the horizontal thrust of the bank.

The raw Monongahela River water, on its way to the pumps, flows under a steel box float which skims off large floating debris, and through bar screens made of railroad rails set 5 in. apart, into three separate wet wells. See Fig. 2. In each well is a traveling water screen having 6-ft wide baskets of copper wire screen cloth with $\frac{3}{8}$-in. square openings. In back of the traveling screens lime is added, as needed, to reduce the acidity of the water to a tolerable level.

At the front and rear of each wet well is a 48-in. wide by 84-in. high motor-operated sluice gate which permits isolating and emptying any one of the three wells for screen repairs. From the wet wells, the water flows through a tunnel under the main pump house floor, through 48-in. by 84-in. sluice gates, into one of two pump suction chambers. From here the pumps pick up the water and start it on its way to the mill.

Pump Installation

At present three pumps are installed but space was provided for a fourth unit when water demands exceed the present capacity. The middle pump has a double suction line, one leg of which extends into each of the two pump suction chambers. Thus, two pumps can be kept operating when one chamber is shut off for cleaning or pump repairs.

The three main pumps are single stage horizontal units, driven by 1250 hp motors. They operate at 720 rpm and each will deliver 21,000 gpm (30 mgd) at a total dynamic head of 192 ft with a 12 ft suction lift. They have 30-in. diam suctions, 24-in. diam discharges and are equipped with a fully automatic priming system.

After emerging from the pumps, the water passes through rotary strainers which remove the very fine materials not caught by the traveling screens. By now, the screened and limed water is ready to play its part in making steel. It leaves the pump house in two 36-in. steel pipelines and after going through a drainage sump pit, just upstream of the pump house, where pressure and volume is metered by the orifice method, it is piped to the locations of its eventual use.

Just downstream from the pump house is the liming plant. Here, from either of two 50-ton capacity steel silos, pebble lime is fed to two 2000-lb-per-hour continuous lime slackers. The quantity of lime water fed to the wet wells as mentioned before is automatically regulated by a lime control system.

During the 1936 Pittsburgh flood, the river rose from normal pool elevation of 711 to Elevation 742 at the pump house site. However, due to flood control dams that the U. S. Engineers have built on the head waters of both the Allegheny and Monongahela Rivers, the estimated future high water is Elevation 735. To guard against exceptional floods in the future, Jones & Laughlin required that the pump house be designed to withstand flotation and hydrostatic pressure if the river should rise to Elevation 743, which is at the top of the concrete substructure.

Design for High Water

As screened openings through the front walls of the wet wells at Elevation 715 prevent unwatering the wet wells, tunnel, and pump suction chambers when the river is above that elevation, the walls of these parts were designed only to resist water pressure with the river at Elevation 715. The walls and floor of the main pump room, however, were designed to resist water pressure with the river at Elevation 743. The 4-ft thick floo. was designed to resist uplift on a span from wall to wall.

The walls were reinforced vertically to span from the floor to horizontal beams at Elevation 735 with the part above being designed as a cantilever. These horizontal beams are supported by concrete struts at the same elevation, on 21-ft centers. The beam along the upstream end of the building, however, spans the full width of the structure. At the downstream end of the building these beams and struts are

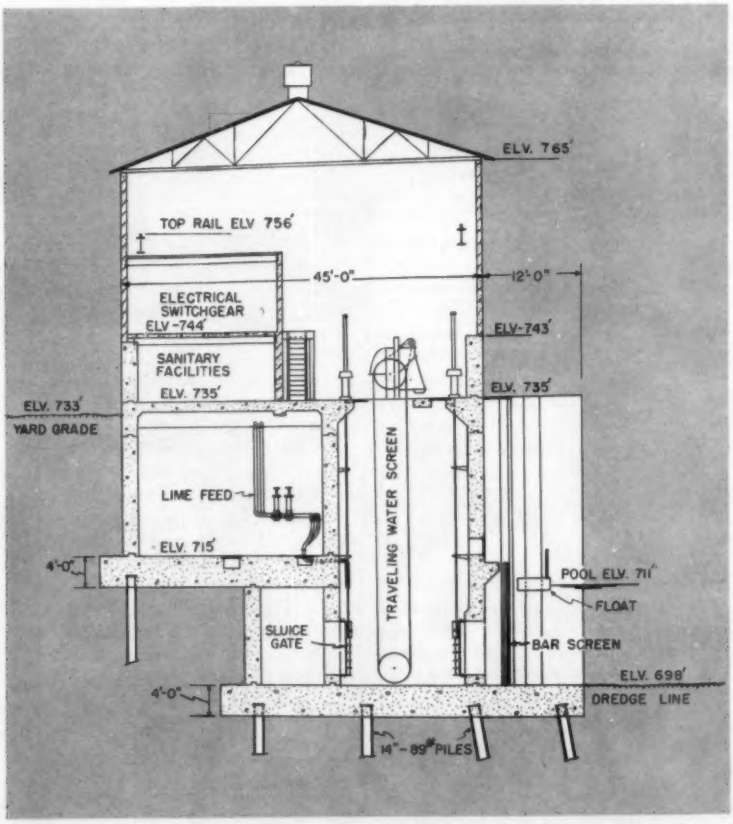


Fig. 2. Illustration shows the vertical section through the intake area at the downstream end of the Jones and Laughlin pump house at the Pittsburgh Works

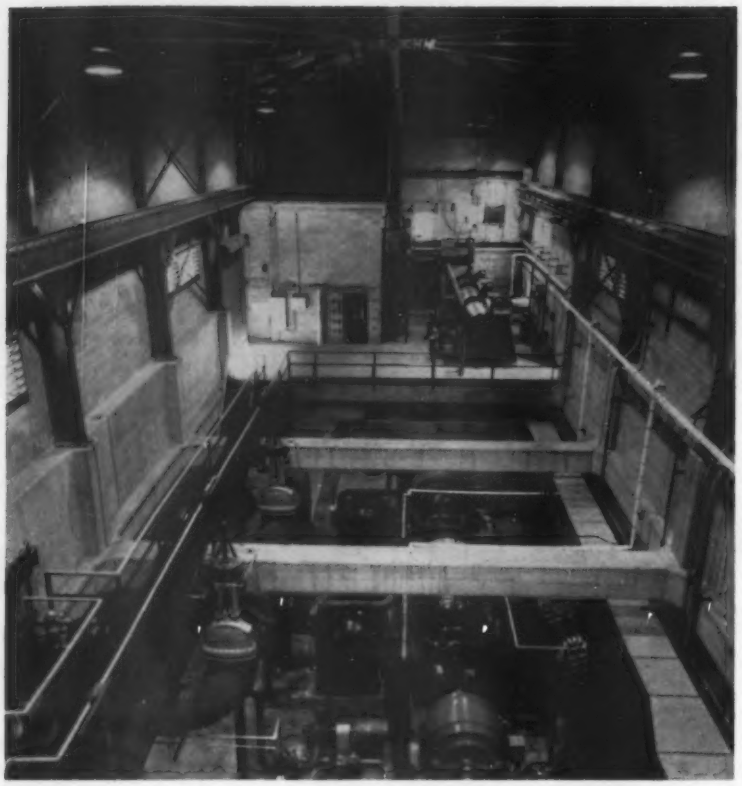


Fig. 3. View of the pump room at the Jones and Laughlin pump house. In the background, at right, can be seen the enclosed tops of three traveling screens

replaced by a concrete slab at Elevation 735 to furnish a working platform.

Portion of the pump house below the bottom of the main pump room floor was constructed in a single skin cofferdam of steel sheet piling. After concrete had been poured to Elevation 711, the front row of cofferdam piling was blocked to this concrete. Earth berms, with their tops about 6 ft above normal river, were built to connect the upstream and downstream ends of the front wall of the coffer to the river bank. Then the cofferdam bracing was removed and the two ends and the back row of sheet piling pulled. This method allowed the remainder of the pump house to be built in the open.

Another example is the addition, Fig. 4, to the river pump house that was built for Weirton Steel Co. at Weirton, West Virginia, in 1954. Here, different conditions resulted in an entirely dissimilar pump house. The original Weirton pump house was a circular structure of 36-ft 6-in. inside diameter. Originally it housed four 11,000-gpm horizontal motor driven centrifugal pumps but, as water needs increased, these were replaced by units of larger pumping capacity. At present, there are two 15,000 gpm and one 50,000 gpm pumps in this structure.

In 1926, Dravo Corp. built an addition to this pump house on the downstream or south side in which were installed three 22,000 gpm pumps. Since then, one of these pumps has been replaced by a 30,000 gpm capacity unit. The new addition, 58 ft 6 in. long by 32 ft wide, is located on the upstream or north side of the original round pump house and extends from 21 ft below normal pool to 60 ft above pool. It contains one 30,000 gpm pump at present, but room has been provided for another 30,000 and a 50,000 gpm pump for future increases in pumping capacity. The installed pump is a single stage horizontal unit, driven by a 2,000 hp motor. It operates at 720 rpm and will deliver 30,000 gpm (43 mgd) at a total dynamic head of 210 ft. The suction piping is 30-in. in diameter while the discharge is 24-in.

At this site, since bed rock is only about 12 ft below pool, it was logically decided to found the structure on rock. The presence of two railroad tracks along the top of the river bank, immediately behind the new structure, dictated the use of a cofferdam driven to rock to hold enough of the river bank in place so rail traffic could be maintained on the landward of the two tracks. The back wall and upstream end of this coffer was Z-type steel sheet piling braced by two sets of steel and timber cofferdam bracing. The

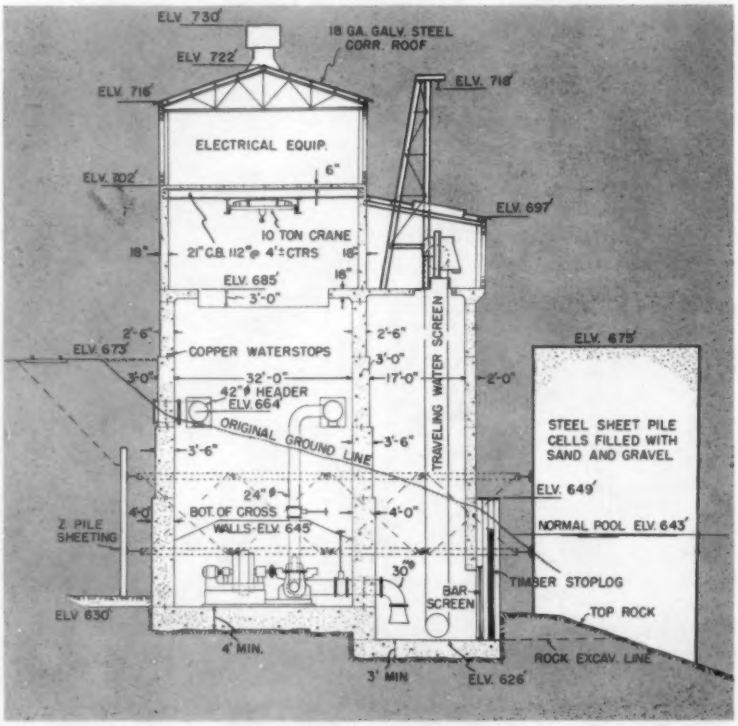


Fig. 4. Cross section of the Weirton Steel Company's pump house addition shows construction data plus the arrangement of the traveling screen, pump and piping

river side was of steel sheet pile cellular construction to resist the horizontal thrust of the bank. Advantage was taken of the presence of these cells to mount a 15-ton whirler crane.

In the pump house, the water is led through structural steel bar screens, having 4-in. spaces between bars, into four wet wells. At present, two of these wells contain 8-ft wide traveling water screens with No. 12 gage screen cloth of No. 2 mesh (3/8-in. square openings). When the other pumps are placed in service, additional water screens will be installed in the other two wells.

Each wet well can be unwatered, when the river is at normal pool, by the use of timber stop logs in front of the bar screens and timber bulkheads over the openings that interconnect all the wet wells. As the acidity of the river at this location is low, it is not necessary to add lime for neutralization. Also at this job, the water goes directly from the pumps to the discharge line and rotary strainers are not used.

Structural Design

As was true with the Jones & Laughlin pump house, this structure also was designed to resist hydrostatic pressure and flotation with the river at high stage, in this case to Elevation 692, 10 ft above any previous high water. The side walls of the pump room were made 4 ft thick at the bottom and decreased to 2 ft 6 in. thick at the top. The upstream end wall varied from 5 ft to 3 ft 3 in. in thickness. Cross walls 2 ft thick provide intermediate support to the horizontally reinforced side walls which were keyed and dowelled into the old pump house to make the new structure water-tight. As screened openings through the front wall of the screen chamber prevent unwatering of this part of the structure when the water is above pool stage, the walls of this section were made 2 ft thick and were designed to resist water pressure with the river at Elevation 743, normal pool.

The pumps are serviced by an overhead 10-ton crane that travels the length of the pump house. The traveling water screens are serviced by a pair of 10-ton chain hoists hung on a trolley beam that is supported by tall structural steel A-frames. The top floor houses the electrical equipment.

The two foregoing examples describe rather large pump houses. An example of a smaller structure is the intake, Fig. 1, built for Pittsburgh Steel. Co. at Monessen, Pa., in 1952.

Before this new structure was built, water was fed to the pump house, located on the right bank of the Monongahela River, by five 36-in. diam cast iron suction pipes. These ran out horizontally from the wall of the pump house and extended down vertically to about 8 ft below the normal surface elevation of the river. The only screening performed was by a wood pile structure that surrounded the suction area. The outside face of this structure was covered from 6 ft below pool to high water elevation by wood planks nailed to the piles and spaced to leave about a one inch gap between them. Occasionally some of the suction pipes would become clogged with leaves, twigs, fish or other debris that passed this crude screening.

The new intake of reinforced concrete, is 58 ft 9 in. long by 19 ft 3 in. wide and extends from 17 ft below pool to 35 ft normal water level. At each end of the structure is a wet well that contains a 10-ft wide traveling water screen with screen cloth having 3/8 in. square openings. In front of each traveling screen is a structural steel bar screen having 4 in. spaces between bars. After passing through the screens the water is lead to a suction chamber which forms the central part of the intake structure.

Old suction lines were removed one by one back to the horizontal sleeve that came out of the pump house wall. Each was extended horizontally through the back wall of the new intake and then down vertically into the new suction chamber. This new intake provides a dependable source for the 100 mgd of clean water required.

The new structure is supported on a 4 ft 6 in. thick concrete base slab which, in turn, is supported on 160 wood piles driven to rock, 37 ft below normal pool elevation. This base slab was poured under water in a single skin, steel sheet pile cofferdam 32 ft wide by 66 ft long. This provided a very economical foundation which was completely adequate for the loads to be supported. The cofferdam piling was cut off at the top of the concrete base and part left in place forms a permanent protection against the river, ever scouring out the material from under the structure.

Another example is the intake that was built in 1953 by Dravo Corp. for the Atlantic City Electric Co. at its Deepwater Power Station on the Delaware River at Penns Grove, New Jersey. This reinforced concrete structure is 16 ft wide by 24 ft long and extends from 22 ft below mean low tide to 10 ft above. It contains a trash rack of wrought iron bars placed 2 in. apart to remove debris from the water. After passing through this trash rack, the water flows through an 80-ft long twin tunnel, to a new pump house that was being erected for the utility. Each half of the tunnel is 6 ft 3 in. square inside 12-in. thick walls. Both the intake and tunnel were built in the dry inside a single skin steel sheet pile cofferdam. They were founded on a bed of sand, clay and gravel which was completely adequate to support the weight of these structures.

As the principal use of the water at this facility is for cooling purposes, it was very desirable to keep the warm discharge water from being drawn back into the intake and recirculated through the plant. To accomplish this, Dravo built a structural steel frame crib faced on one side with a continuous wall of steel sheet piling. This crib, built parallel to the flow of the river, extends about 54 ft upstream and 96 ft downstream from the centerline of the new intake.

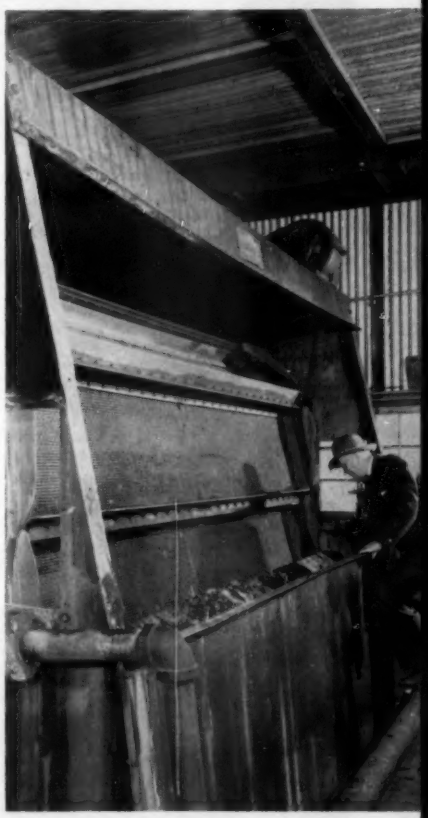


Fig. 5. One of the two 10-ft wide traveling screens in Pittsburgh Steel Intake

As pump house and water intake facilities are so important to the operation of plants and mills dependent on continuous water supplies, they are worthy of considerable study. Beyond the selection of the pumps and accessory equipment, plant engineers are confronted with the problems of structure design as affected by the varying factors encountered in every shoreline construction project.

Illustrations: Delta Power Tools

Fig. 1. In the Quality Woodcraft, Kane, Pa., plant a band saw is used for both production and making shipping crates. They turn out special wood frame windows, doors, altars and pews for churches. The company obtains lower operation cost by using its saws for more than one application

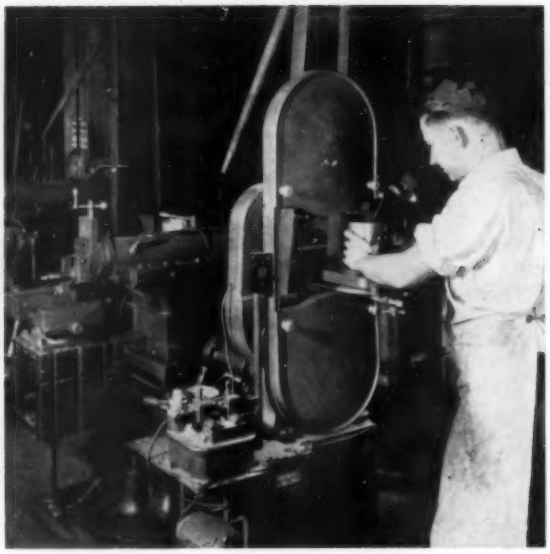


Fig. 2. Milwaukee Die Casting Co., Milwaukee, uses a band saw on its production line to precision cut 700 castings of various design in one hour. It has resulted in a 100 per cent savings in production time. Previously, gates on castings were broken off or filed with almost 50 per cent rejection

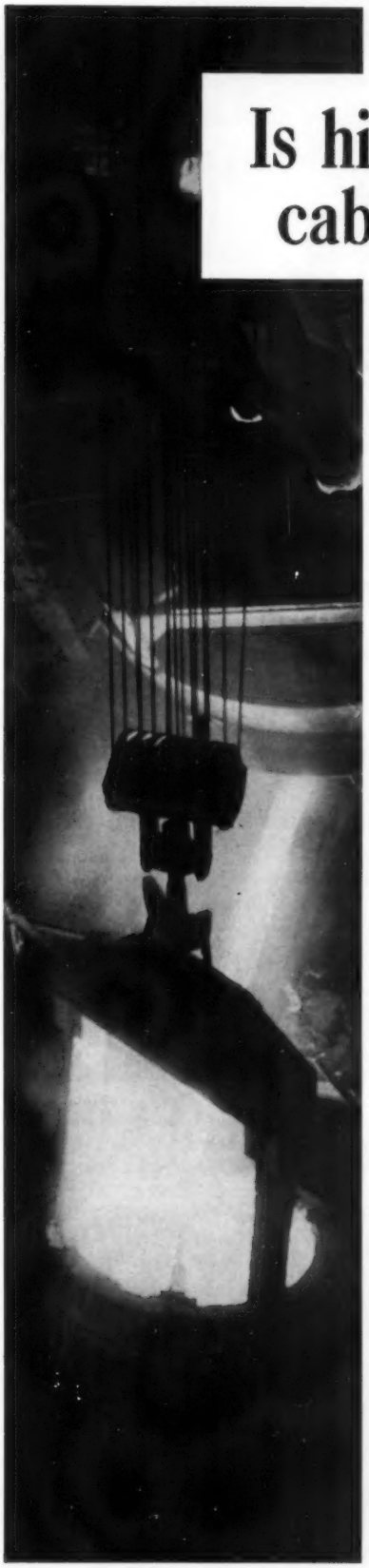
Band Saws—
Are You Employing Yours to Good Advantage?

MULTIPLE USE of power tools, for either plant maintenance or production on a precision or semi-precision basis, can contribute to low-cost operations.

In many cases, power tools are purchased to perform only one operation when they can be used to advantage handling a number of different operations.

Fig. 3. Operated 8 to 10 hours a day, six days a week, this saw is used in many ways at the Hangar Shop of American Airlines, Inc., La Guardia Field, N. Y. For woodwork, the machine cuts floor boards, partitions, and doors used on planes. For metal, band saw cuts special jigs and forms

Fig. 4. By placing a band saw, formerly used for odd wood and metal cutting jobs, on its production line, Major Die and Tool Mfg. Co., Milwaukee, is able to obtain a labor saving of 18 to 26 hours. It saws a 4½ by 5½ in. solid steel punch so accurately that both halves are used without waste



Is high heat or humidity your cable application problem?

Selecting the right cable to meet specific application problems is often a task that calls for considerable discussion between customer and cable supplier. You know your operating conditions . . . and General Electric engineers at headquarters and in the field can help you select the right cable for these conditions. That's why we maintain a staff of wire and cable specialists to serve you at key points all over the country.

Here's how three G-E wire and cable specialists in different parts of the country recently answered important problems concerning cable applications involving high heat and humidity.

How can circuit maintenance costs in high-temperature applications be reduced?

"The life of natural rubber insulation is often drastically shortened when it must operate at the temperatures found in a steel mill. What's needed is a material that doesn't dry out and crack. My recommendation — G-E silicone rubber-insulated cable. Tests and field experience have shown that this insulation will operate in 400 F ambients. Even when it is directly exposed to flame, it burns gradually, forming a nonconductive ash. Therefore, circuits with damaged insulation can remain operative until cable can be replaced," . . . *L. F. Cudlin, Los Angeles.*

Is there a cable without metallic sheaths that is suitable for applications involving both moisture and high temperature?

"Applications involving high ambients and moisture are not a severe problem today, thanks to G-E silicone rubber-insulated cable. This cable has undergone prolonged water immersion tests—without lead sheathing—with no loss of electrical or physical properties. And it has excellent resistance to many oils, solvents and other chemicals," . . . *L. L. Young, Cincinnati.*

Can this new silicone rubber-insulated cable be used in existing conduit?

"It not only can be used in existing conduit, it can often be used to boost the capacity of existing conduit systems as much as 30%. Its conductor temperature rating is 125 C, compared to 77 C for cable with ordinary insulation. Moreover, G-E silicone rubber-insulated cable handles and installs just like ordinary rubber-insulated cable," . . . *P. N. Drew, Detroit.*

Of course there are many different environmental factors that can affect a cable installation. So, when you have an application problem, it's a good idea to give *your* G-E cable specialist the facts, and let him help you select the right cables for the job. Or write to Section W170-864, Construction Materials Division, General Electric Company, Bridgeport 2, Connecticut.

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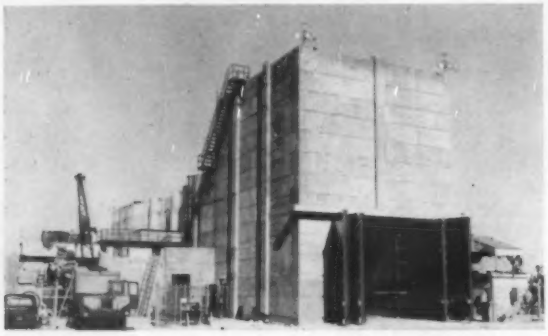
For more facts circle 569 on Reply Card

Concrete Blockhouse Lined Acoustically to Silence Jet Engines

BUILT OF REINFORCED CONCRETE and lined with sound-absorbing material, a jet engine sound suppressor is nearing completion at the Fort Worth plant of Convair, a division of General Dynamics Corporation.

Dimensions of the completed structure will be 158 ft in length, 38 ft wide at the intake and 33 ft wide at the exhaust end. The height will vary from 54 ft at the intake end to 39 ft at the exhaust end, with the latter extending 7 ft below grade. All exterior walls, roof slabs, splitter walls and ceiling slabs are 12-in. concrete with double layer of reinforcing steel. The center section of the structure is additionally reinforced with four large concrete frames that encase the building proper.



The main doors of the structure occupy an opening 20 ft square and consist of two pairs of double doors. Each door is 10 in. thick and built of steel framing and mineral insulation, covered with ¾-in. plywood, 1/16-in. asbestos paper and 16-gage galvanized steel.

A control house, completely air conditioned and soundproof, is located at one side of the structure and houses all instrumentation for jet engine testing together with controls for fuel, CO_2 system, cooling water spray and special electrical facilities.

Atop the control house, a masonry structure contains all power facility requirements, including transformers, distribution panels, contactors and rectifiers.

Observation windows are made of two-inch laminated bullet-proof glass, and one-half inch Herculite glass, separated by approximately two inches of air space containing a desiccant of silica gel. The Herculite glass is located on the test cell side and is readily removable for replacement at any time.

Acoustical treatment has been designed to reduce the over-all sound intensity level of jet engine tests, from a maximum of approximately 150 decibels in the test area to a maximum of 85 decibels in the control house. Other degrees of sound suppression met in the design are reduction of frequencies to make speech audible 50 ft away from the test center. High intensity sound will be reduced to the point where it will not be detrimental to nearby buildings or annoying to residents in nearby housing areas.

New High-Speed Welding Technique Deposits Weld Metal at Five Times Usual Rate

AN AUTOMATIC submerged-arc welding process which will deposit metal up to five times as fast as comparable welding methods and at half the power cost, is in final stages of development at the Alliance, Ohio, Research Center of The Babcock & Wilcox Company.

Known as the I^2RT method, the new process is applicable to submerged arc welding, in which the bare electrode is fed through a layer of granular flux, and to inert gas shielded welding. Standard submerged-arc welding practices have been based on the principle that deposit rate is directly proportional to the diameter of the electrode.

This theory holds true with flux-coated electrodes, where current density is limited. However, B&W found that desired weld patterns could be made at deposit rates that were inversely proportional to wire size for a given current. In one case, for example, a higher deposit rate was obtained with a $\frac{3}{32}$ in. diameter electrode at 650 amp than with a ¼ in. electrode at 800 amp.

Experiments subsequently revealed that the deposit rate at high current density is directly proportional to the length of the electrode wire from the contact shoe to the arc.

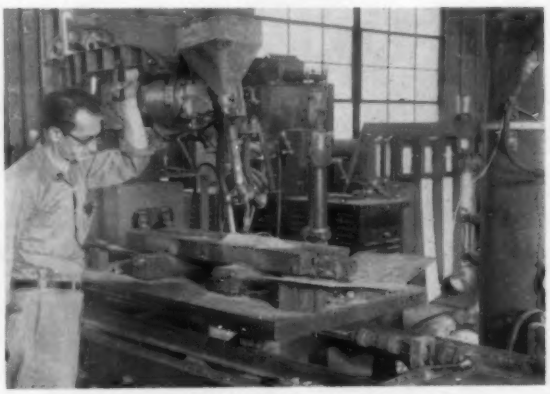
This discovery led to the I^2RT principle of submerged-arc welding. The new process preheats the electrode almost to its melting point before it enters the arc. Thus the arc does not have to supply the sensible heat required to bring the metal to the melting point. Practically all the energy absorbed by the electrode at the arc supplies heat of fusion to melt the metal.

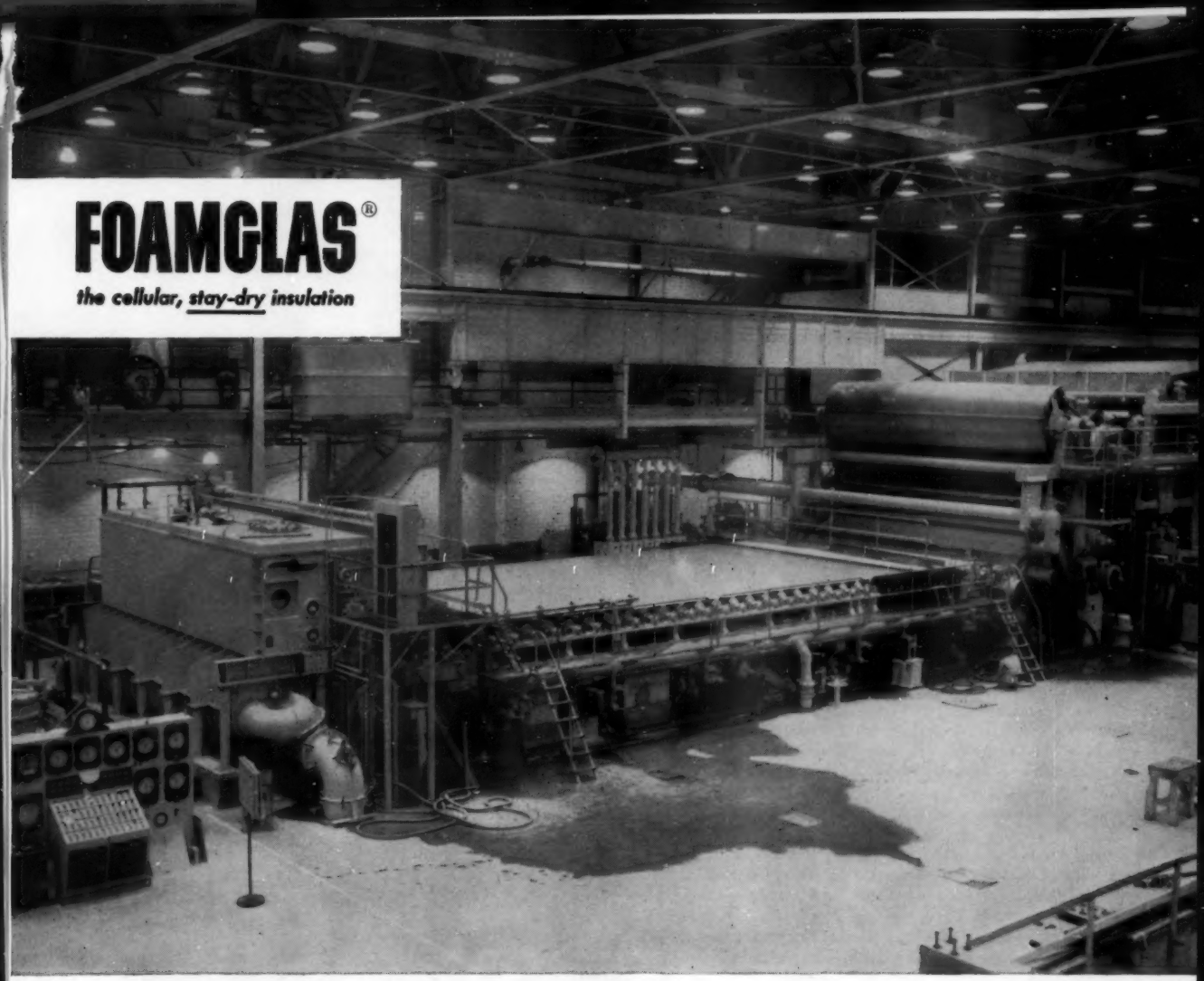
The new welding technique uses current densities varying from 70,000 to 270,000 amp per sq in., as compared with 10,000 to 20,000 amp per sq in. using other methods. B&W is currently using carbon steel wire electrodes with tensile strengths of 70,000 psi for production work.

In operation, a voltage sensitive relay controls the length of electrode projecting from the nozzle. Changes in the load voltage are received by this relay, which signals the raising or lowering of the weld head.

Granular flux, through which the wire is fed, is composed of finely divided metal oxides. Flux depth is approximately 1 to 1½ in. A special guiding device keeps the weld head and arc trued up with the work.

The I^2RT welding method can be adapted to existing welding systems. Conversion would consist mainly of installing suitable transformer capacity and increasing the rate of feeding the wire electrode. In some cases larger or additional transformers would be required, since the new process needs double the load voltage formerly required. Travel speeds would also have to be increased.





FOAMGLAS®

the cellular, stay-dry insulation

Paper maker or rainmaker?

FOAMGLAS insulation makes the difference!

When it's cold outside and hot and humid inside, a paper mill could readily "make rain" . . . unless effective insulation prevents condensation from forming on a cold underside of the roof deck.

Ordinary insulations won't do, because they lose efficiency fast when exposed to the moisture and acid atmospheres prevalent in pulp and paper processing mills. That's why Great Northern Paper Company insulated the roof of this new E. Millinocket, Maine mill with moisture-proof and acid-proof FOAMGLAS.

One of the largest newsprint producers in the U.S., Great Northern has underway a $45,000,000 expansion program which includes several buildings with FOAMGLAS-insulated roofs. They first used this cellular glass insulation four years ago because the rugged Maine winters and high humidities make high resistance to moisture essential for insulating efficiency.

In *any* plant it'll pay you to use this unique insulation. For a sample block of FOAMGLAS and latest literature please write today.

Pittsburgh Corning Corporation
Dept. PE-85, One Gateway Center
Pittsburgh 22, Pennsylvania
In Canada: 57 Bloor St. W., Toronto, Ontario

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Consulting Engineers: Stone & Webster Engineering Corp., New York, N.Y. Roofer: Bangor Roofing & Sheet Metal Co., Bangor, Me.

Roofing Procedure Facilitates Use of Vapor Seal on Steel Deck

TESTS AT THE Factory Mutual Laboratories, that clearly established the need for fire retardant vapor seals over metal decks, have led to their commercial applications.

The new seal is composed of non-flammable, plastic Koroseal, a B. F. Goodrich product distributed by Lexsuco, Inc., which is attached with moppings of a new non-flammable rubber base cement over steel decks.

One of the first installations of the new vapor seal is at the Dickenson Elementary School, Mt. Clemens, Mich. Here, it is applied to Fenestra acoustical panels which serve as the roof deck, joists and finished acoustical ceiling.

The light gage steel panels are 29 ft long, and consist of a 24 in. wide flat plate welded to a 7½ in. by 9 in. hat section, providing a cellular box beam. The flat perforated bottom plate, backed by a Fibreboard acoustic batt, produces an 80 per cent noise reduction coefficient. The section is a package, encompassing ceiling joists and roof deck in one structural unit.

Over the vapor seal, insulation is laid with fire resistant adhesive. The tar, asphaltic paper and gravel roof is then put down over the insulation.

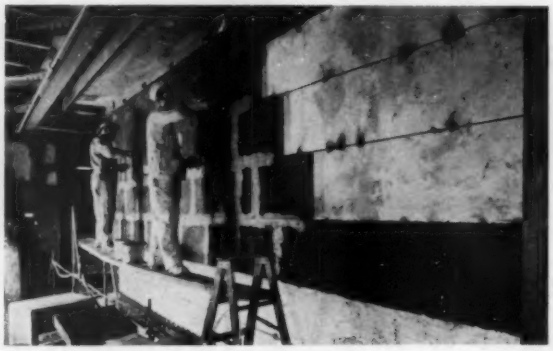
Boiler Waterwall Insulation Combines Blocks, Cement and Rope

EFFICIENT METHODS have been developed by the Detroit Edison Company for insulating boiler waterwalls at the Conners Creek and St. Clair power plants.

Expanded metal is secured on studs welded to the boiler tubes. The studs are staggered, and spaced 18 in. vertically and 24 in. horizontally. The lath, fastened to the studs by large washers and speed clips, serves as a base for a 1½ in. layer of refractory cement. Quarter-inch diameter pencil rods are then welded horizontally to the ends of the studs.

Over the refractory cement, 18 in. by 24 in. mineral wool blocks (Mono Block, made by Baldwin-Hill Co.) three in. thick, are fastened to the pencil rods with wire. The tie wires, fastened to two adjacent pencil rods, are brought together over the face of the block and tied.

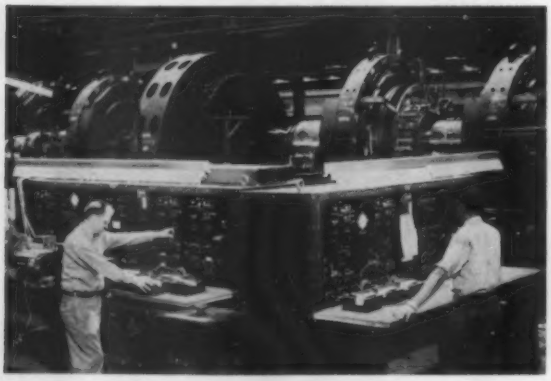
All joints and voids in the block insulation are filled with mineral wool insulating cement. Installation of ⅛ in. boiler casing, which will bear against ¾ in. asbestos rope barriers, completes the job. The rope barriers are installed either vertically or horizontally, or both, to prevent bypass of flue gas between the setting and casing at draft differential zones, and to break chimney effects.



Test Center Provides Facilities for "Running In" Electrical Equipment

THOROUGH pre-shipment tests, simulating actual customer operating conditions, can now be performed on large rotating electrical equipment up to 70,000 kva in the General Electric Company's new test center, at Schenectady, N. Y.

Part of the G-E Large Motor & Generator Department's $8-million expansion program, the million dollar center makes possible the testing of synchronous condensers up to 70,000 kva. Large hydro-generators can be assembled and tested before shipment, instead of after installation. Large d-c motors and generators can be tested before delivery to the customer, and large a-c synchronous and induction motors and generators can be tested by the zero power factor method.



The center occupies an area of 4,188 sq ft in G.E.'s Building 60, with the instrument stands on the plant floor proper occupying about 1,425 sq ft. The large rotating machines to be tested are erected in the assembly area and run by power lines from the test room.

Heart of the test room is a synchronous generator with a base rating of 60,000 kva, driven by a variable speed d-c motor to provide test current of variable frequency. A motor-generator set to supply the d-c current, exciter sets, and elaborate switchgear are also in the test room, which has its own filtered air supply.

Test current at zero power factor lagging—with voltage and current 90 degrees out of phase—can be supplied to the largest rotating equipment G. E. makes.

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WHEN you apply new SUPER WESTWAX it's just like laying down a protective sheet of tough, transparent plastic on your floors.

With NEW SUPER WESTWAX you get
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NEW
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MIRITE®
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prime #1 yellow Carnauba Wax.

IT combines all the features of the finest floor protection in a single wax:
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— resists water
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MARSH

Vapor Tension DIAL THERMOMETERS

Wider range of application

...TIME PROVED MARSH QUALITY

The best of all we have learned in 90 years of instrument making has gone into Marsh Dial Thermometers. They are the versatile, vapor tension type—the type that covers the widest range of needs . . . brought to the highest stage of development in the broad Marsh line.

Ambient temperatures have no effect on dial readings of Marsh Vapor Tension Thermometers. Therefore no compensating adjustments are ever needed. The distant reading type will give highly accurate readings even when located far from the point of temperature measurement. All thermometers have the famous Marsh "Recalibrator"—quickest and best way to keep an instrument accurate.

The Marsh line is the most complete line: Rigid stem thermometers are available in dial sizes of 2½", 3½" and 4½"; distant reading types in sizes of 2", 2½", 3½", 6", 8". All are made in 12 different ranges reading as low as —40° F. and as high as 350° F., and in scale lengths to cover all services. An outstanding contribution to their practical application is the wide range of bulb types available to suit all services. Cases are available in patterns for all mountings and in black steel, polished brass, nickel and chromium plate.

DISTANT READING

RIGID STEM

The JAS. P. MARSH Corporation SKOKIE ILLINOIS 90th ANNIVERSARY YEAR 1865 · 1955

Catalog covers all details — types, ranges, case patterns, dimensions, bulb variations, dial graduations. Write for it.

MARSH INSTRUMENT CO., *Sales affiliate of Jas. P. Marsh Corporation*
Dept. W, Skokie, Ill.
Marsh Instrument & Valve Co., (Canada) Ltd. • 8407 103rd Street, Edmonton, Alberta, Canada

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For more facts circle 572 on Reply Card ——→

1. **"SAFE-TREAD" MULTIGRIP** makes tough flooring and steps that won't chip, crack or splinter. Note structural use of Multigrip on rear corners.

2. **USS MULTIGRIP** Floor Plate was used on cab floors to insure safe footing and longer life.

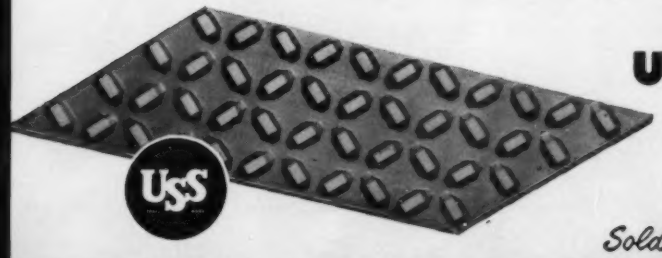
3. **IN ADDITION, USS COR-TEN** High Strength Steel used in floor and side supports, gave added strength with no increase in weight.

1250 Railway Express trucks *safe-treaded* by York-Hoover with Multigrip

A busy Railway Express driver needs safe, sure footing every time he steps into or out of his truck. It was for this reason that the York-Hoover Corporation, manufacturers of truck bodies, used USS Multigrip "safe-tread" Floor Plate on the cab floors, body floors and steps of 1250 new Railway Express trucks. Multigrip was used on the rear corners of the trucks to help prevent damage caused by backing into loading docks.

Not only in trucks like this, but in plants and factories of every kind, proper flooring can do much to eliminate accidents and add to safety. Multigrip Floor Plate has symmetrically raised sections that are flat-topped to provide safe, comfortable footing. They won't chip, crack or splinter on your plant floors, aisles and stairs. Multigrip is easier to clean, too. Available in large sections that are easily cut and shaped. It cuts down waste. It's built tougher to last longer, even in heavy traffic areas. Increase plant safety and minimize maintenance problems by using Multigrip "safe-tread" Floor Plate.

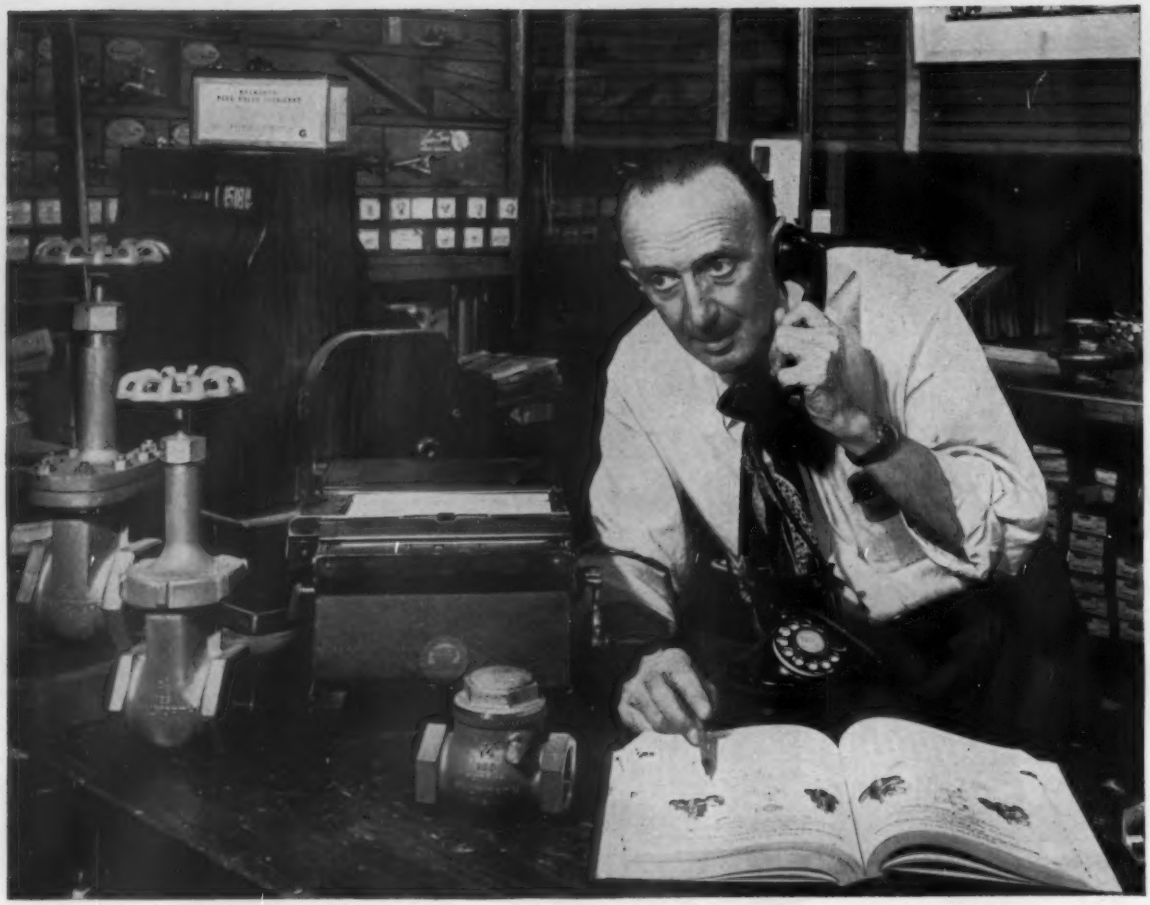
UNITED STATES STEEL CORPORATION, PITTSBURGH • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, CHICAGO
UNITED STATES STEEL EXPORT COMPANY, NEW YORK



USS multigrip FLOOR PLATE

Sold by leading distributors from coast to coast

UNITED STATES STEEL



*Fictitious name used to typify over 400 Walworth Distributors

Here's why it pays to do business with distributors like Mr. Hansen*

Andy Hansen is typical of Walworth Distributors throughout the nation. He has been a distributor of Walworth Valves and Fittings for years. Like Andy, the Walworth Distributor in your area provides these services and savings:

He reduces your inventory costs. He's aware of the valve and fitting needs peculiar to his area. He stocks the products that will best serve your needs. Deliveries are always prompt and economical – emergency orders can generally be delivered within hours.

He offers you application and engineering assistance. His technical experience can be invaluable in solving your particular problems. He has 50,000 Walworth products at his disposal. You can be sure that the items he recommends are exactly right for the job.

He is a double guarantee. His business depends upon providing you with the very finest products and unsurpassed service. Every valve and fitting is backed by his own reputation and that of Walworth – a complete line manufacturer.

There's a Walworth Distributor near you ready to help. Call on him today.

WALWORTH

valves . . . pipe fittings . . . pipe wrenches

60 East 42nd Street, New York 17, N. Y.

Walworth Company of Canada, Ltd., Toronto

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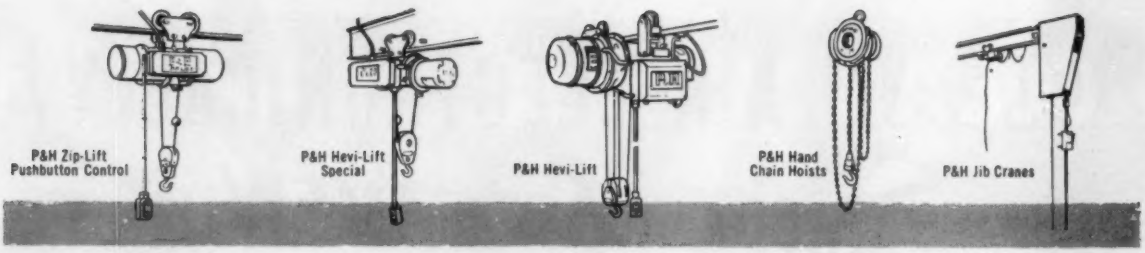
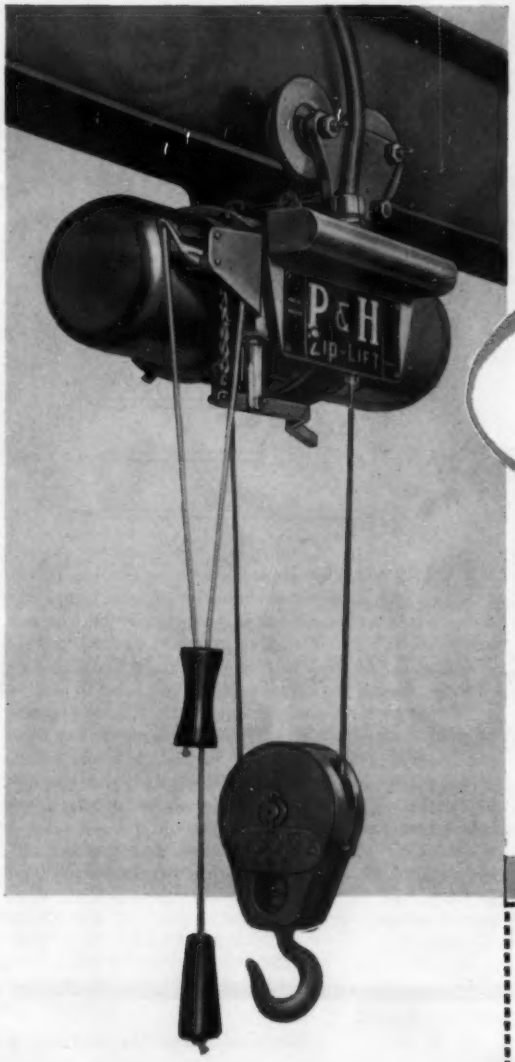


Here's News! Now the P&H Zip-Lift Special gives you a wire rope hoist at electric chain hoist prices!



HERE'S another new hoist added to the most complete line in the business. And P&H has kept manufacturing costs down so that you can't afford to pass up this terrific value.

Just take a look at the price list on the new rope-control Zip-Lift Special!

Capacity	Price
250 lbs.	$145.00
500 lbs.	194.00
1000 lbs.	219.00
2000 lbs.	224.00

Two disc brakes on every hoist. Ten feet of lift is standard — available in 14', 18', and 20' lifts at slight additional cost.

Get hold of your P&H Distributor. Ask him to give you the complete information on this new unit — the P&H Zip-Lift Special. If you're in too much of a hurry to wait, send the coupon in to us. We'll see that you get complete specifications by return mail. P&H Hoist Division, Harnischfeger Corporation, 4696 West National Avenue, Milwaukee 46, Wisconsin.

HARNISCHFEGER

Tear out and mail today!

P&H Hoist Division
Harnischfeger Corporation 3019
4696 West National Avenue, Milwaukee 46, Wisconsin

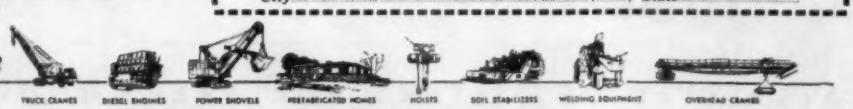
Gentlemen: The new Zip-Lift Special sounds like a money-saver to me. Send me complete information as fast as you can.

Name ..... Title .....

Company ..... Address .....

City ..... ( ) State .....

the P&H *Line*



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CLEAN AIR ELECTRONICALLY

THE Electro-STAYNEW WAY

Eliminate SMOKE, AIRBORNE DUST, POLLEN

IN ALL TYPES OF VENTILATING SYSTEMS

WITH Electro-STAYNEW PRECIPITATORS

for INDUSTRY

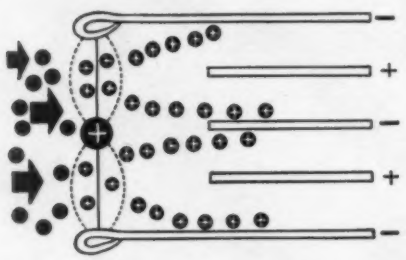
Give your plant tested, economical clean air protection.

Write for Bulletin 400

for complete information

Based upon the principle of "electrostatic precipitation," the Electro-Staynew Precipitator charges the dust particles positively (+) as they enter the unit. The particles are then attracted to and held by the negatively (−) charged collector plates as shown in the diagram below.

By this method, the Electro-Staynew removes dust,



smoke, soot, and microscopic particles (as small as 1/250,000 of an inch in diameter) from the air with higher efficiency and lower maintenance cost than is possible with any other type of filter. In addition, this new Electro-Staynew Precipitator has unit construction—ionizing and collecting chambers are in one compact unit.

The simple unit construction of the Electro-Staynew gives it unusual flexibility. Combinations of the two basic cell sizes make possible complete installations of any desired capacity. This feature saves time in assembly and simplifies installation. The lightweight construction permits overhead mounting where necessary.

The Electro-Staynew Precipitator can improve the efficiency of your workers, the quality-control of your products; and its extremely low maintenance cost makes operation economical.

DOLLINGER PRECIPITATOR ELECTRO-STAYNEW

DOLLINGER CORPORATION 55 Centre Park • Rochester 3, N. Y.

ALL TYPES OF FILTERS FOR EVERY INDUSTRIAL NEED

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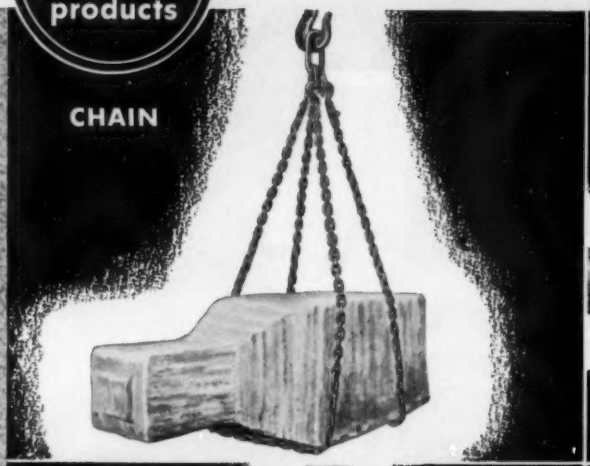
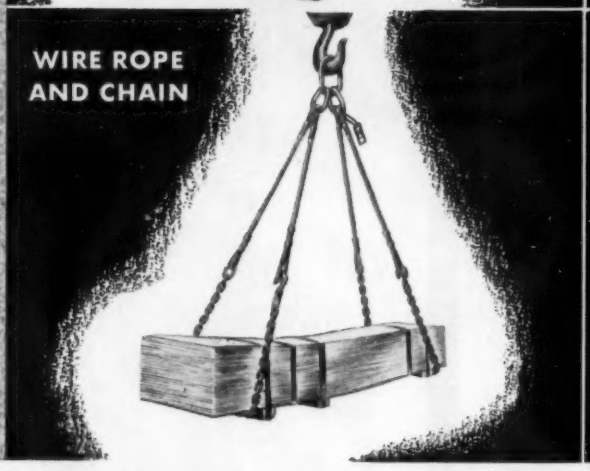
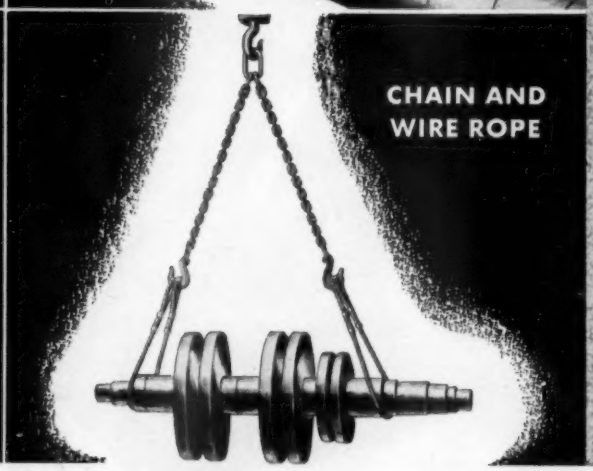
ACCO products

ACCO Registered* Slings–Wire Rope & Chain

THE STANDARD OF EFFICIENCY AND SAFETY







Different Loads Require Different Slings

–AND ACCO Registered* HAS THEM ALL!

• The shape or weight of a load, its temperature, protruding sharp corners—all these and other factors should influence the choice of a sling for any particular job. On some jobs chain slings are best. In others the characteristics of wire rope make it the first choice. And in still other cases a combination of wire rope slings and chain slings will provide the greatest lifting efficiency.

The safest slings available

Each component of an ACCO *Registered** Sling is made from the best materials procurable for its use. Each part is first individually tested—it must prove to have strength equal to or greater than the sling body. All hooks for ACCO *Registered** Slings are also Magnaflux tested. Then these components are assembled into slings according to carefully engineered designs that have proved themselves in rigorous field tests.

The completed sling is then individually proof-tested to twice the working load limit. Then and only then, is it awarded the coveted ACCO Registration certificate and the ring or the tag as the case may be.

Compare this quality control, precise manufacturing, and proof testing with the necessarily hit-or-miss methods used in producing "home made" or hand assembled slings. You'll see why ACCO *Registered** Slings are safer.

And ACCO *Registered** Slings cost less in the long run. Their precision design and manufacture insure longer life—cut your overall lifting costs. Your ACCO Representative has the facts. If you don't know who he is, please write our office at Bridgeport, Conn.

*Trade Mark Registered

Write our Bridgeport Office for helpful literature

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for Better Value

Busway with Alcoa Aluminum Bus Bar

COSTS LESS,

SIMPLIFIES DESIGNS,

PACKS MORE POWER!

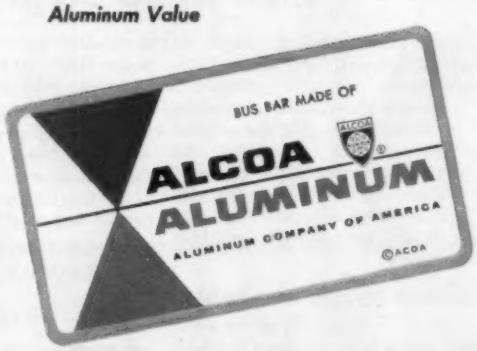
Westinghouse
Bus Duct being fabricated
at its Beaver, Pennsylvania, plant.

This new aluminum busway with Alcoa® *Aluminum* Bus Bar is one-third lighter than copper busway of equal conductivity. It has greater current-carrying capacity, pound for pound, than cable in conduit. It is prefabricated in standard sections . . . installs easily and quickly in any layout.

Alcoa's new No. 2 EC aluminum bus bar was developed to meet the demands of distribution bus for superior properties. It provides the most favorable combination of strength, conductivity, low creep and light weight at a significant saving in cost.

Wherever your production requirements demand an efficient, flexible electrical distribution system, specify busway with Alcoa Aluminum Bus Bar. Aluminum Company of America, 2301-H Alcoa Bldg., Pittsburgh 19, Pennsylvania.

Your Guide to Aluminum Value



ALWAYS USE ALCOA® ALUMINUM ACCESSORIES WITH ALUMINUM CONDUCTORS

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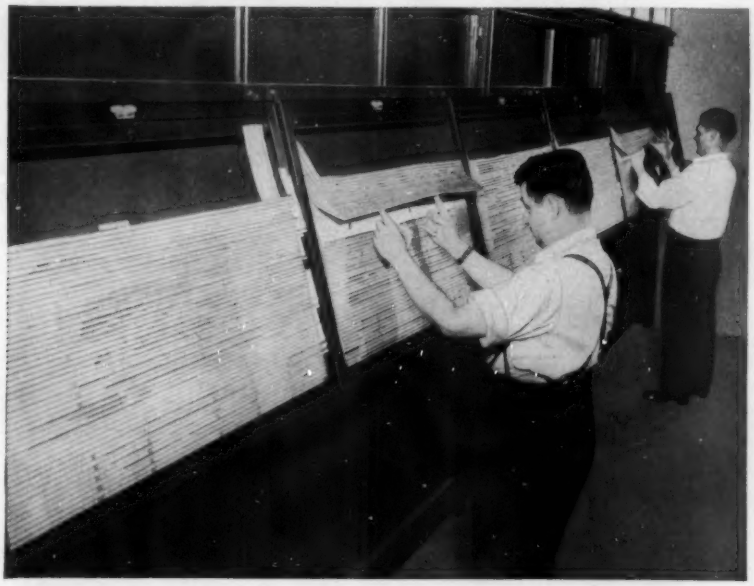
Remington Rand

BETTER BUSINESS METHODS

For Greater Profits Through Lower Costs



NOW—Still More Effective Machine Loading With New, Simplified Sched-U-Graph System

Profit-conscious manufacturers have long recognized the value of an effective system of machine loading. They have also long recognized that the *most effective* system of machine loading is based on the Remington Rand Sched-U-Graph.

Now, a new, simplified Sched-U-Graph System gives you more accurate and precise machine loading than ever before. With this new system your machine loading will be divided easily into two phases: *Rough Machine Loading*, for scheduling operations as far into the future as is deemed practical; *Fine Machine Loading*, for scheduling in minute detail those operations to be undertaken in the next two weeks.

This new system accomplishes all the following:

1. Indicates available machine capacities for handling any new work that arrives.

2. Reveals and locates bottlenecks and lags.

3. Assures proper sequence of shop orders to meet schedules, thereby keeping Work-In-Process Inventory at a minimum.

4. Controls production by measuring performance against an established plan, resulting in better customer service and lower costs.

In short, the Remington Rand Machine Loading System solves the problem of how to get *the greatest possible production return for each dollar you invest in machines, men, and facilities.* At a glance, this system, utilizing visible charting, tells you the load ahead of each machine, work station, or machine center... the jobs that constitute that load... all scheduled starting and completion dates... how much free machine time is available, and when it is available. All the benefits and methods of the new Remington Rand Rough & Fine Machine Loading System are explained fully in our new free folder. Write today for KD738.

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Cut Production Costs With Closer Inventory Control

The absence of complete control of manufacturing inventory results in needless wastes of time, labor, money, and facilities. You can eliminate these wastes by switching now to the Remington Rand System of Inventory Control for Manufacturers.

Profit-eating overstocks mean increased investment and expense, more space for storage, deterioration and obsolescence. Understocks mean lost sales and extra expense for "rush" orders and emergency buying.

For your guidance, Remington Rand offers a new illustrated booklet, "Inventory Control For Manufacturers," which contains all the most modern and effective techniques for controlling inventory and thereby reducing investment in material and clerical record-keeping costs. Circle KD406.

Remington Rand

DIVISION OF SPERRY RAND CORPORATION

Room 1824, 315 Fourth Ave., New York 10

Yes, I'd like to have the literature circled.

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Title_____

Company_____

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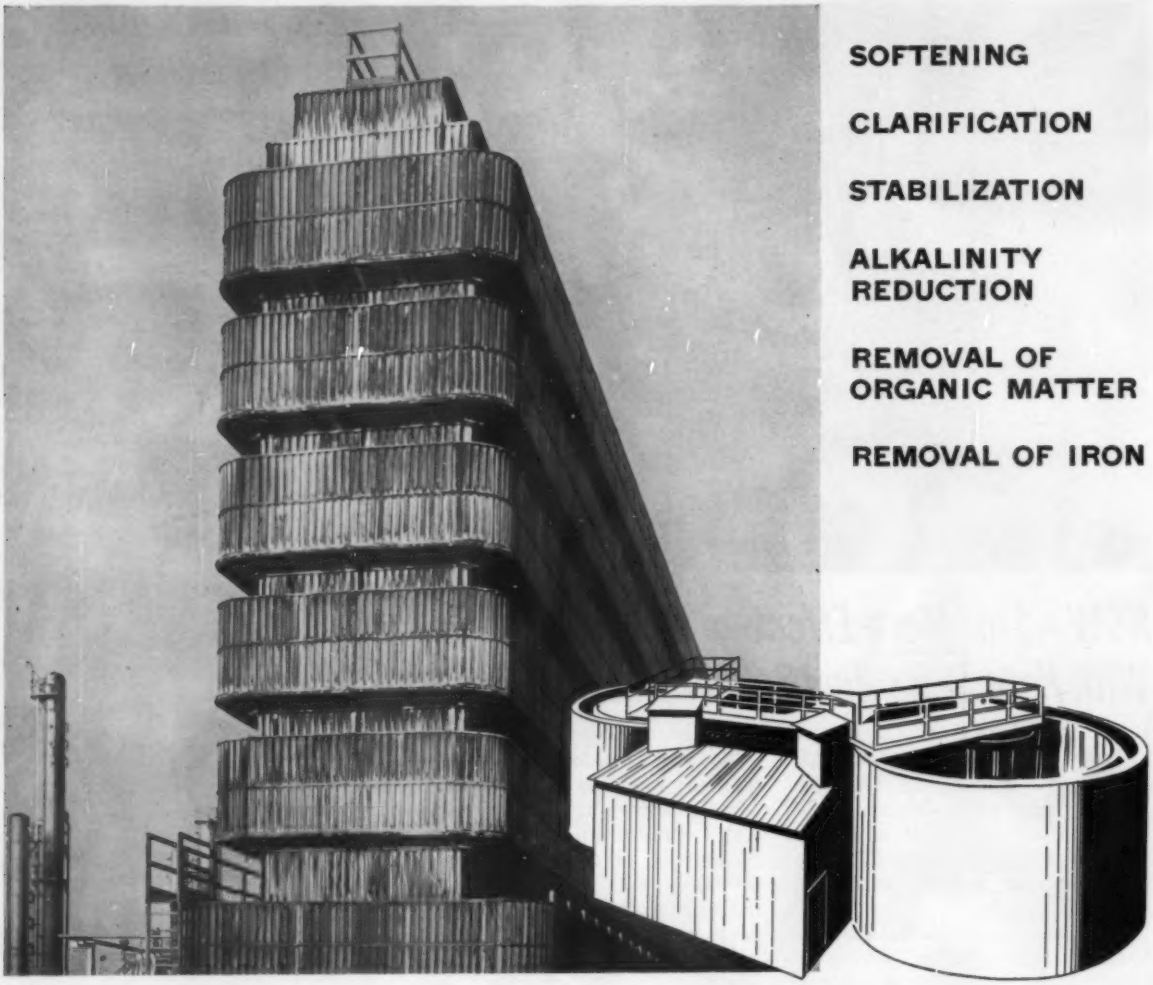
1-26

Profit-Building **IDEAS** For Business

COOLING WATER PROBLEMS?

Let INFILCO engineers help you on...



SOFTENING

CLARIFICATION

STABILIZATION

ALKALINITY REDUCTION

REMOVAL OF ORGANIC MATTER

REMOVAL OF IRON

In heat exchange operations, where cooling water is involved, nothing is more important to effective, economical operation than clean, non-scaling, non-corrosive water. Whether your needs are small or large, the experience of INFILCO engineers and properly selected INFILCO equipment can solve your problem.

For partial softening and alkalinity reduction, removal of turbidity, suspended and organic matter, and iron, ACCELATOR® treating plants are widely used.

For softening, zeolite softeners may be used alone or in conjunction with "ACCELATOR" treating plants. Side stream continuous clarification can be handled by one of several types of filters. For pH adjustment, chemical feeding equipment is available.

Such equipment is giving superior service throughout industry—in gas and gasoline plants, refineries, public utilities and municipalities. It will pay you to investigate. Write for complete details.

INFILCO

The one company offering engineered equipment for all types of water and waste processing—coagulation, precipitation, sedimentation, flotation, filtration, ion exchange and biological treatment.

INFILCO INC. 916 South Campbell Ave., Tucson, Arizona
Field offices in principal cities in North America 5529

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VARITROL®
automatic variable speed

SAVES MANPOWER

IMPROVES PRODUCT

INCREASES OUTPUT

Now, by controlling speed with the Varitrol as a component of the U. S. Varidrive motor, speeds can be *automatically* changed in response to a signal *without* human attention for precision-control operations. At right is shown just one of the many ways in which Varitrol automatic control of U. S. Varidrive motors can be used for automatic production control. An educational booklet, edited by variable speed engineers, illustrates with applications this method of greater production of more goods and services at lower cost and astounding man-hour savings. Write today for your complimentary copy.

SYNCHRONIZATION

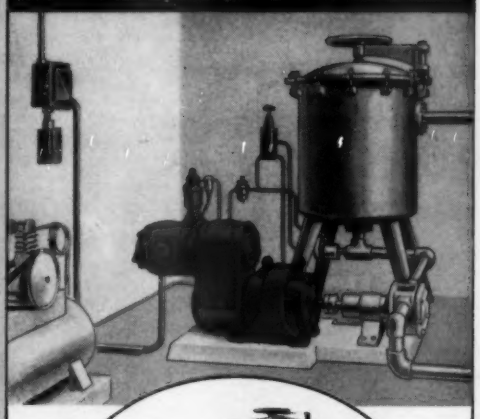
CONSTANT VELOCITY

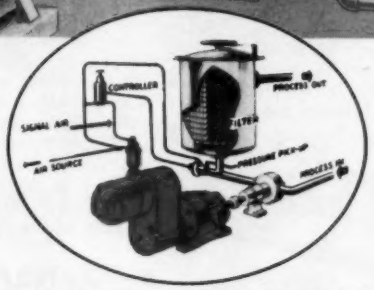
WEIGHT CONTROL

HUMIDITY CONTROL

HEAT CONTROL

PRESSURE CONTROL





A Varidrive-operated pump runs at high speed with clean filter to obtain maximum flow. As filter clogs, pressure pick-up signals Varidrive which gradually slows down to limit filter back-pressure. When filter is clean, speed automatically increases.

U. S. VARIDRIVE WITH VARITROL®

◀ Send for informative full-color booklet on Automatic Speed Control

U. S. ELECTRICAL MOTORS INC. PE-8
P. O. Box 2058, Los Angeles 54, Calif. or Milford, Conn.

☐ Send Varitrol Automation Booklet No. 1882
☐ Send U. S. Varidrive Booklet No. 1797

Name_____

Company_____

Address_____

City_____ Zone____ State_____

For more facts circle 580 on Reply Card

NEW PRODUCTS AND PROCESSES summarized for your convenience

Edited by M. E. Heniken

More information on any of these products can be yours without cost or obligation. Just circle the item numbers on the Reader Service Cards provided on pages 161-162.

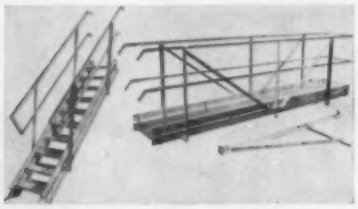
1—POSITIONER RELAY KIT solves valve problems

This positioning relay kit is available for field application to any air-operated control valve. Manufacturer claims the relay will solve such major valve positioning problems as stuffing box friction load, poor response, unbalanced inner valves, hysteresis, and undesirable regulating characteristics. Where control valves are integral with control systems, relay is useful in maintaining stable sensitivity and response, amplifying control signals, and providing sequence operation of two or more valves.

Standard SAMA signal ranges of 3-15 psig or 3-27 psig actuate a force-balance mechanism. As little as 0.065 psig input signal change will apply full output (50 psig max) to valve motor. Relay is direct or reverse acting, suitable for top or bottom-connected valves. Six pre-shaped cams are supplied for square root, linear, square, and half-travel regulating characteristics. Bailey Meter Co.

2—STEEL STAIRWAYS are installed without trusses

These steel stairways and walkways for industrial installations have dual hand rails which serve as supporting truss and provide an additional safety factor as well, suspending the stairways and walkways rigidly when bolted to the structure.



No supporting truss rods are needed. For interior installations or bridging, floor space conservation is a distinct advantage of the design. Stairways, with safety treads, are fabricated in 4, 6, 8 ft sections which may be bolted together in any length and any practical height. The sections come equipped with toe boards, angle iron hand rails and supports. The standard design is 26 in. wide, prime painted with oven dried coat of aluminum finish paint. Or, sections may be hot dipped galvanized after fabrication. Columbian Steel Tank Co.

3—COG V-BELT works in temperatures up to 180 F

This heat-resistant cog V-belt is announced for use in such hot spots as baking, coffee roasting, candy making and chemical plants. Belt operates at room temperatures up to 180 F, company says. The cog feature is incorporated to eliminate possibility of covering or jacket becoming checked or cracked from extreme heat. Having no covering material, it dissipates heat rapidly. It is said to be impervious to oil and grease damage. The Dayton Rubber Co.

4—INTERIOR PAINT resists moisture, chemical fumes

Corosobar is a rubber-base interior paint, of the new styrene-butadiene family. It is announced as notable for ease of application and color retention. According to the manufacturer, the paint possesses exceptional resistance to severe moisture conditions, chemical fumes and even occasional direct contact with acid and alkali solutions. Corosobar is suggested for use on walls, ceiling and equipment surfaces. The Tremco Mfg. Co.

5—PUMP CONTROL SWITCH is reverse action unit

This low cost control is designed for applications requiring protection on loss of pressure or to initiate a cycle of operation on rising pressure. It is capable of operation at pressures to 80 psi. Single- and double-pole versions are available. Applications include protecting machinery against lubrication failure, as in the supply side of lubrication systems.

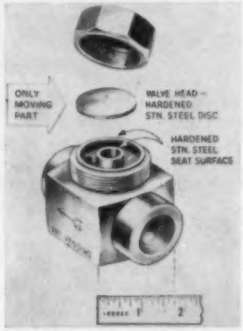
A toggle and over-center arrangement is used to assure snap action in the make and break of contacts. Range and differential may be field adjusted, manufacturer notes, and the differential can be varied from 10 to 30 psi. Although compact, the switch is said to have ample space for easy wiring. Square D Co.

6—SOUNDPROOF ROOM serves as quiet office

The Quiet Room is designed to provide better production efficiency for supervisory and control personnel through the use of a quiet office. According to company, the Quiet Room is constructed with high noise reduction characteristics in all frequency bands. Specially made to serve as offices and recreation rooms in noisy areas, the units are available in many sizes and, in addition, their dimensions in all directions can be changed at any time by addition of company's standard panels. Industrial Acoustics Co.

7—STEAM TRAP for pressures from 10 to 600 psi

Newest addition to this manufacturer's Thermodynamic line of steam traps is the TD-50 which, without changes, is designed for use on any pressure from 10 to 60 psi. The trap is also claimed to work equally well on light or heavy loads and close tight on no load. It operates



against back pressures up to 50 per cent of the inlet pressure. Like other traps in the line, the TD-50 uses the thermodynamic energy of steam to close the valve.

Machined from stainless steel bar stock, this trap consists of only three parts; body, screwed cap and valve head. Compact, this trap measures only 1¾ by 2⅛ by 2¾ in. It is pointed out that because the trap is all stainless steel, it resists internal and external corrosion. It is also said to be unaffected by water-hammer or vibration and to be freeze-proof when installed in a vertical line with an open discharge line. The trap discharges at saturated steam temperature, it is noted, and has a high air venting capacity. Sarco Co., Inc.

8—RESET VALVE has many emergency safety uses

Type 73-20 Manual Reset Valve is announced for emergency safety services requiring quick, positive action. Combining simplicity of design with positive action, the valve has many applications. It may serve as a safety shutoff in either liquid or gas fuel lines, as a safe open valve for steam or foam fire snuffing systems, manufacturer points out, or to shut down pipelines that indicate a line break by loss of pressure. It utilizes bodies, trim and topworks of company's

Looking for millionths of an inch to keep your Crane Valves tighter longer

How big is a micro-inch?

At Crane it's *mighty big* . . . because it is one of the noticeable differences between Crane Quality Valves and the run-of-the-bin kind.

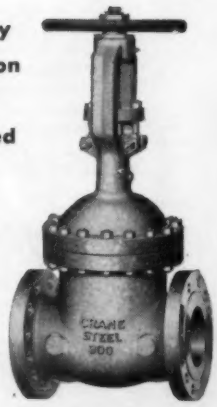
Measuring seating surface smoothness in micro-inches is the job of the Crane technician in the picture. His findings are important to keeping Crane production at the high-quality level.

Crane carefully measures seating surface smoothness to make sure that the Crane Valves you install will operate smoothly without seizure, seat tightly and wear longer, thus helping reduce your maintenance and repair costs to the minimum.

Such care in manufacture for more than 100 years is just *one* reason why thrifty buyers prefer Crane Valves . . . why industry keeps on using more Crane Valves than any other make . . . why you should always buy Crane.

Crane Co., General offices: 836 S. Michigan Ave., Chicago 5, Ill. Branches and Wholesalers Serving All Industrial Areas.

Better Quality
Bigger Selection
in Valves
for Every Need



CRANE CO.

VALVES · FITTINGS · PIPE
KITCHENS · PLUMBING · HEATING

CRANE'S FIRST CENTURY...1855-1955

For more facts circle 581 on Reply Card

Here's a Dust Collector that cleans itself!

These exclusive features make the new Hydro-Filter virtually self cleaning... can make maintenance a matter of minutes a month:

NO MOVING PARTS
. . . to wear or corrode within collection area.
NO INTRICATE PARTS
. . . to clean. Water action and glass spheres do the work!
SLUDGE CONVEYOR
. . . lifts out. Works at slow speed for top dewatering action.
NO DEAD AREAS
Entire interior is constantly flushed. Every inch is active to collect dust!

New HYDRO-FILTER maintains constant efficiency because it's easy to maintain!

Ease of maintenance and constant efficiency go hand in hand with the new Hydro-Filter to give you your money's worth in *constant* service at rated capacity.

Air, water and glass spheres do the work in the Hydro-Filter. There are no parts within the collection area to corrode or erode . . . nothing to wear or "load up" requiring hours of painstaking maintenance. Continual flushing of the filter bed and automatic sludge removal make it self-cleaning on a "round the clock" basis. A constant automatic, air-water balance assures effective, thorough dust removal through a wide variation in volume and velocity of flow . . . your *answer* to maintenance-free wet collection down to the micron range.

Write for Bulletin 55
Describing the unique filtering principle which makes constant flow wet collection possible with the National Hydro-Filter

NATIONAL HYDRO-FILTER

Dust Collector Corp.
604 Machinery Hall Bldg.,
Chicago 6, Illinois

Subsidiary of National Engineering Company, Manufacturer of Simpson Mix-Mullers.

For more facts circle 582 on Reply Card

NEW PRODUCTS

(Begins on page 130)

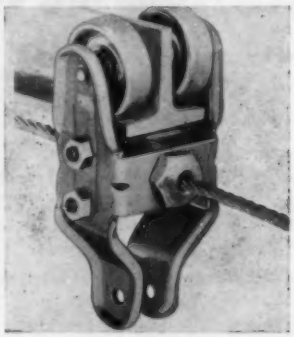
diaphragm control valves with delatching trip mechanism to provide any usually specified requirement, with such response remaining effective until manually reset. Black, Sivalls & Bryson, Inc.

9—PIPE FITTINGS made of unplasticized PVC

Now available is a line of solvent welding pipe fittings and flanges of injection molded unplasticized polyvinyl chloride. It includes 90- and 45-deg elbows, tees, unions, couplings, caps, reducing bushings and flanges. It is explained that solvent welding fittings permit fast, easy installations with a minimum of tools and equipment. And since both the fitting connecting surface and the pipe connecting surface are smooth there is no notch effect. PVC piping systems fitted with these solvent welded fittings are suggested where installations are of a permanent nature (the threaded type is said to be preferable where disassembly, revamping, or revising of the system may be required). According to company, solvent welded fittings are preferred in erection of Schedule 40 piping since they result in more durable installations. Tube Turns Plastics, Inc.

10—CABLE CONVEYOR is easily installed

Cable-Way Conveyors are cable-type systems for handling up to 250 lb per hanger. The continuous conveyor track is



prefabricated 2 by 2 by ¼ in. T-rail with all-bolted construction. Support rods and mounting brackets, bolted to the track during assembly, are furnished. A minimum of welding or cutting is necessary, says manufacturer. The conveyors are said to be easily installed or rearranged. Trolleys are available in 80-, 150-, and 250-lb capacities. Tipp Mfg. Co.

11—SEALING MATERIAL for terrazzo, tile floors

Terrazzo Seal is announced as a sealing material that protects terrazzo, clay tile, ceramic tile, and marble floors. The product is said to give a tough, waterproof seal that resists dirt and stains—

For more facts circle 583 on Reply Card →

INSTALL WIREWAYS FASTER!

SQUARE D's NEW AND EXCLUSIVE *Lay-in Duct*

FASTER ASSEMBLY!
LESS NUTS AND BOLTS
FASTER WIRING!
NO MORE THREADING OR PULLING OF CONDUCTORS...JUST LAY THEM IN
FASTER HANGING!
UNIVERSAL TYPE HANGERS
FASTER GANGING!
KNOCKOUTS MATCH THOSE ON RELATED SQUARE D EQUIPMENT. NO CONDUIT BENDING

Square D's exclusive design provides hinged covers for both the duct sections and connectors. Easily removable fitting covers then provide a completely unobstructed wireway in which to lay wires.

LAY-IN DUCT is available in 2½" x 2½", 4" x 4", and 6" x 6" sizes, in standard lengths of 1, 2, and 5 feet. There is a complete line of fittings, all with the "lay-in" design feature.

• • •

Write for the complete story of **LAY-IN DUCT**—how it gives you a better wireway system, easier, faster and at less cost. Address Square D Company, 6060 Rivard Street, Detroit 11, Michigan.

ASK YOUR ELECTRICAL DISTRIBUTOR FOR SQUARE D PRODUCTS

SQUARE D COMPANY

You can solve your **tough** corrosion problems by using Bitumastic® Coatings

This steel piling is subjected to salt air and salt water—a highly corrosive combination. But the steel is not attacked because it's protected by Bitumastic® No. 50—a heavy-duty coating specially formulated to control the severest corrosive forces.

TOUGH CORROSION PROBLEMS can be solved, but not by using ordinary paints or conventional protective coatings. For long-term protection, it takes *specialized* protective coatings . . . the Bitumastic Coatings Koppers makes.

Bitumastic Protective Coatings are specially formulated from a tar-pitch base* that is, for all practical purposes, impervious to moisture. These coatings keep moisture away from exposed metal surfaces . . . and that's the *best* way to stop corrosion.

With tough, durable Bitumastic Protective Coatings, a thickness up to eight times that of ordinary paints can be obtained in one application. Where other factors are equal, the *thicker* the coating the *longer* the period of protection.

Send for a set of free booklets describing the family of Bitumastic Protective Coatings. At the same time, tell us about *your* corrosion problems so that we can suggest a satisfactory solution. There is no obligation, of course.

**Hi-Heat Gray is a non-coal-tar vehicle and metallic pigment.*

See our catalog in S or write for copy

KOPPERS COMPANY, INC.

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DISTRICT OFFICES: BOSTON, CHICAGO, LOS ANGELES, NEW YORK, PITTSBURGH, AND WOODWARD, ALA.

MADE ONLY BY KOPPERS

BITUMASTIC PROTECTIVE COATINGS

SOLD THROUGH INDUSTRIAL DISTRIBUTORS

KOPPERS ®

For more facts circle 584 on Reply Card

NEW PRODUCTS

(Begins on page 130)

even those of greases and chemicals. Tests indicate that floors sealed with Terrazzo Seal provide an excellent base for waxes. It prevents discoloration and damage from improper cleaning methods, company says, makes floors easy to clean, and gives a safe, non-slippery surface which is impervious to water and simple to maintain. Easily applied seal dries quickly, it is noted—traffic need not be kept off floor more than 4 hr. Huntington Laboratories, Inc.

12—ACOUSTICAL BAFFLES reduce reflected noise

Microlite Acoustical Baffles are intended for noisy industrial areas as well as for office areas in industrial plants. They are announced as low in cost, light in weight, and having a wedge shape that reduces reflected noise up to 60 per cent. Made of glass fibers, bonded with a thermosetting resin, the baffle is incombustible, vermin-proof, rot-proof and impervious to bacteria and mold, it is pointed

out, and it will not dust or crumble. It comes foil-faced for light reflectivity and cleanability, or plain for maximum economy. The baffle is 2 ft high, 3 ft long and 6 in. deep across the bottom. It weighs only a pound.

The baffles can be installed easily by maintenance men, says company, as each baffle comes in flat sheet already cut to size. The two edges are folded up into wedge shape and fastened together with wire hangers, then hung on light-gage wire stretched across the ceiling. The wedge shape is claimed to make the baffle ideal for installation where lighting, and other facilities near the ceiling prevent a continuous application of sound absorbing material. The baffles can be hung low to trap noise near its source, or ceiling-high to catch reflected sound. L. O. F. Glass Fibers Co.

13—MECHANICAL SEAL comes ready to install on shafts

The BB-21A Mechanipak Seal is specifically designed for use on rotary shafts at pressures to 150 psi. It is furnished completely assembled, ready to install. Standard construction includes brass

Wissco Belts travel stamped aluminum plates for domestic refrigerator evaporators through multi-temperature-zone brazing furnace. This is another example of how . . .

FAMOUS NAMES

ride on WISSCO BELTS

Reynolds Metals Company • Louisville, Ky.

Reynolds Metals Company, recognized as a leader in the aluminum industry, uses 80-20 alloy Wissco Rod Reinforced High Temperature Belts in this production-line operation at its Louisville plant.

The Wissco Belts are repeatedly subjected to elevated temperatures ranging from 1025° F. to 1190° F. and to the corrosive action of a salt flux. Wissco Belts have been used since the Reynolds plant was opened. They are standing up extremely well, and give economical service with minimum maintenance.

Wissco Alloy Processing Belts are the choice of many famous names in industry—leaders in their fields. You, too, will find Wissco the most economical and efficient belt for high temperature jobs—for metals, ceramics, glass annealing and decorating.

For details, *just write or call our nearest office:*

THE COLORADO FUEL AND IRON CORPORATION
Denver and Oakland

WICKWIRE SPENCER STEEL DIVISION
Atlanta • Boston • Buffalo • Chicago • Detroit • New Orleans
New York • Philadelphia

WISSCO BELTS
PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
THE COLORADO FUEL AND IRON CORPORATION

CF&I

2770

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MATHEWS

BUILDING THE BEST IN MATERIALS HANDLING EQUIPMENT FOR 50 YEARS

The Mathews line of package handling equipment is complete, including all types of gravity and power conveyers and special conveying machinery. Whatever the requirement — a few sections or a complete system — or whether the loads weigh 1 lb. or 30 tons, it is a job for Mathews engineers.

A complete package conveyer system, including gravity roller conveyers, live roller conveyers, and reversible belt conveyers—applied to maintain a continuous flow of material through production, storage, and shipping.

The Mathews line includes light (Chainveyor), medium, and heavy-duty overhead trolley conveyers. Transverse bends in this system bring small castings from ceiling to working level.

This system of roller and belt conveyers takes the hard work out of handling and inspecting passenger car and truck tires. The tubular-type supports shown provide easy, infinite adjustment of the conveyer lines.

Part of a warehouse bag handling system consisting of reversible, inclined and level, general purpose belt conveyers.

Mathews builds a complete line of standardized conveyers — including portable roller and wheel sections in either steel or aluminum, portable belt conveyers, ball transfers, lumber conveyers, stevedore dollies, and chain store check-out belts.

50th Anniversary MATHEWS CONVEYERS 1905-1955

GENERAL OFFICES . . . . ELLWOOD CITY, PENNSYLVANIA
PACIFIC COAST DIV. MATHEWS CONVEYER COMPANY WEST COAST SAN CARLOS, CALIFORNIA
CANADIAN DIVISION . . MATHEWS CONVEYER COMPANY, LTD. PORT HOPE, ONTARIO

Engineering Offices or Sales Agencies in Principal American and Canadian Cities
Export Representative—Foreign Trade Division of New York Hanseatic Corporation

For more facts circle 586 on Reply Card

NEW PRODUCTS

(Begins on page 130)

shell, brass washer, and Buna-N bellows. Seals are available for shafts from 3/8- to 3-in. diam. Buna-N or Neoprene bellows are furnished for operating temperatures to 212 F and pressures to 150 psi. Silicone bellows are provided for temperatures to 400 F where pressures do not exceed 50 psi. According to company, these seals eliminate wear on shafts and shaft sleeves, eliminate fluid leakage, and cut maintenance costs. Bulletin AD-150 gives complete information. The Garlock Packing Co.

14—TRACTOR SHOVELS are four-wheel drive units

Three new additions to the Payloader line of tractor shovels are announced. They include the Model HU, with a heaped capacity of 1 cu yd, and the Model HH, 1½ cu yd, both illustrated below. The Model HO has a 2 cu-yd capacity. These tractor shovels are designed to permit 40-deg bucket "breakout" at ground level,

rather than a 3- or 4-ft "carry" position. Also, to obtain maximum loads with minimum effort, a powerful "pry-out" action is accomplished by using breakout pads on the ground as a fulcrum for leverage, according to manufacturer. A combination of underslung boom-arm design and positioning provides driver visibility and safety, says company, and the fact that the breakout of the load is accomplished at ground level also contributes to safety and speed of operation. Loads can be carried closer to machines and lower.

Largest of the new models, the HO, has a complete "power shift" transmission. There is no clutch pedal and all shifts through all speed ranges in both forward and reverse can be made without coming to a stop or slowing down. It is explained that operating cycles of larger capacity tractor-shovels are slower because heavier load requirements make it necessary to shift frequently between working and travel speed ranges. The new power-shift transmission thus simplifies the driver's work and contributes to efficiency. The Frank G. Hough Co.

15—CARBON REMOVER is improved tank type

Multisol is described as non-inflammable, free of caustic, non-corrosive to aluminum, brass, zinc, tin plate and magnesium. This carbon remover is a two-layer liquid for use in dip tanks. The upper

GENERAL CABLE

THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

When you need Rubber and Plastic Power and Control Cables . . . look to General Cable . . . for every type, for every use . . . for fast deliveries . . . for UNMATCHED QUALITY! These General Cable products have earned an enviable reputation among users for transmission, distribution and control . . . for direct earth burial . . . for duct and conduit . . . for submarine use . . . and for self-supporting aerial applications.

As the biggest producer, General Cable makes the widest range of types. To mention a few: network, high voltage, supervisory and station control, series street lighting, pole and bracket, self-supporting aerial, and generator lead cables.

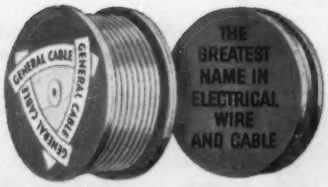
Constructions consist of copper and aluminum conductors. Insulations: GENCASEAL (Thermoplastic Vinyl), polyethylene, THERMAX W (moisture and heat resistant), AQUASEAL (heat and moisture resistant—low SIC), GENCORONE (ozone-resistant oil base), BUTARONE (ozone-resistant butyl base).

Outer coverings include rubber, neoprene, GENCASEAL, lead, reinforced neoprene over lead, and textiles (cotton, glass, asbestos, sisal, jute, rayon).

Armor finishes include steel, bronze, aluminum interlock; flat steel, and galvanized wire armor.

These popular and versatile products are made to meet *every* operating condition. Where standard types are not suitable for your particular use, special constructions will be made to meet your exact needs. Get the complete facts before you buy. Let our engineers help to solve your wire and cable problems. And, remember, that General Cable is the *only* manufacturer who can supply *all* your wire and cable needs!

GENERAL CABLE
CORPORATION



BARE, WEATHERPROOF, INSULATED WIRES and CABLES FOR EVERY ELECTRICAL PURPOSE

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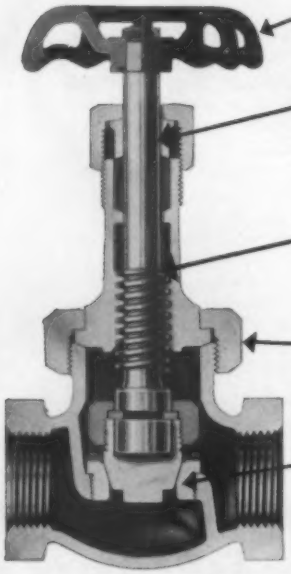
THE KENNEDY "500 BRINELL"

Bronze Globe and Angle Valves *with* Stainless Steel Seats and Discs

KENNEDY'S "500 Brinell" valves set a new quality standard in valve design, engineering and performance. New, rugged construction features cut your maintenance costs because KENNEDY'S "500 Brinell" valves give you longer service life on your toughest jobs. Specially-treated, super tough stainless steel seats and discs give you leakproof performance because they banish common valve enemies. Check these new built-in quality features and see why KENNEDY gives you the greatest valve value:

TWO DISC TYPES { FULLWAY, PLUG TYPE } TWO PRESSURE RATINGS { 200 lbs., 300 lbs. }

Fig. 138S	200 lbs.	Fullway	Globe	¼" to 2"
Fig. 139S	200 lbs.	Fullway	Angle	¼" to 2"
Fig. 138PS	200 lbs.	Plug Type	Globe	¼" to 2"
Fig. 139PS	200 lbs.	Plug Type	Angle	¼" to 2"
Fig. 544S	300 lbs.	Fullway	Globe	¼" to 3"
Fig. 546S	300 lbs.	Fullway	Angle	¼" to 3"
Fig. 544PS	300 lbs.	Plug Type	Globe	¼" to 3"
Fig. 546PS	300 lbs.	Plug Type	Angle	¼" to 3"



"PISTOL-GRIP" HANDWHEEL . . . Fits your hand, gives you a firm, easy 3-way grip on top, sides and bottom! Full palm protection, too.

KENALLOY STEM . . . A new, exclusive KENNEDY stem material that eliminates stem failures because it removes the cause of failures.

ACME THREAD Eliminates feather-edge ends which, in ordinary valves, can break off and lock stem in the bonnet.

UNION BONNET . . . A stronger, tighter joint that easily withstands pressure and pipe wrench punishment.

STAINLESS STEEL SEATS, DISCS "500 Brinell" hardness eliminates cutting by foreign objects, pitting, erosion, corrosion and wire-drawing.

• *FOR COMPLETE DETAILS WRITE FOR NEW BULLETIN 110*

THE KENNEDY VALVE MFG. CO.
1066 EAST WATER ST.
ELMIRA, NEW YORK
VALVES • PIPE FITTINGS • FIRE HYDRANTS

OFFICE-WAREHOUSES IN NEW YORK, CHICAGO, SAN FRANCISCO • SALES REPRESENTATIVES IN PRINCIPAL CITIES

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NEW PRODUCTS

(Begins on page 130)

layer is a floating seal to prevent escape of solvent vapors, reduce drag-out loss of material and rinse the parts as they are removed from the solvent. The lower layer is a combination of solvents, penetrating agents and emulsifiers formulated to break the bond between metal surface and carbon, paint, grease and gums. Deposits thus released fall to the bottom of the tank, it is explained, so that potency of the solution is not affected. No mixing is required for Multisol and it is always used cold. Company says it will remove practically any soil or finish from metal. Brulin and Co., Inc.

16—DO-IT-YOURSELF KITS for welding thermoplastics

The frequent or occasional need of plant engineers for tools, supplies or information on welding thermoplastics is being met by complete kits now available. Each kit includes two books on plastic welding which provide necessary know-how. Tools provided in the kit are a 110-v welding gun with nozzle, 15 ft of nitrogen hose, electrical connections, a nitrogen flowmeter with tubing, a contour marker, a porosity spark tester, marking crayons, and a cutting-trimming knife. The kit costs $150. American Agile Corp.

Use the Reader Service Cards provided on pages 161-162 to ask for more information on these products. Circle item numbers of products in which you are interested.

17—WARNING LIGHT for industrial emergencies

The Hi-Ball Emergency Light for industrial plants can be mounted to cover a wide area in any working space where an emergency might arise. In combination with a horn or siren, an instant alarm can be given with both sound and sight. It plugs into any convenient 120-v a-c outlet and requires no transformer. It is claimed to be the most powerful light of its type. Uses a 1000 hour life bulb around which a silvered parabolic mirror in sharp focus is revolved at 60 rpm. Heavy plastic dome can be red, blue, green, amber or clear. Trippe Mfg. Co.

18—METAL FRAMING, low cost and lightweight type

Called the A Series Channel and Fittings, this low-cost, lightweight all-purpose metal framing is designed for construction of shelving, racks, display framing, mechanical and electrical supports not requiring the weight and strength of company's present P Series. The new series retains the same basic components in scaled-down version. And

before → after

Modern Dravo heating saves this plant $6732 per year, frees 3400 sq. ft. of floor space

Sharp increases in heating costs traveled hand-in-hand with growth and expansion at Ideal Electric and Manufacturing Company's Mansfield, Ohio plant.

As manufacturing additions went on over the years, more and more hand-fired coal stoves were employed to heat new areas. Until recently, heating for the seven-acre plant area was handled by thirty-two such units. Heating problems never seemed to cease. With the lack of uniformity in heating, workers either froze or baked. Coal and labor costs (it took almost the full time of 5 men to fire stoves around the clock) never stopped climbing. Stoves and their bins gobbled up more than 4000 square feet of plant space!

When modern Dravo gas-fired, forced-air space heaters were installed, these problems disappeared, and the savings were immediate and substantial. Since eleven Dravo "Counterflo" heaters provided comfortable heat everywhere in the plant areas, 3600 square feet of valuable space was released ("Counterflo" heaters required only 600 square feet). But, more important was the actual gross savings of $6732 made possible last winter, '54-'55, through the use of these Dravo Heaters. When amortizing this new and standby equipment over a 10 year period, a net savings of $2735 per year is realized!

Remarkable? Then you will want to see for yourself what unusual cost-savings and heating efficiency Dravo heaters can bring to your heating systems. Use the coupon below to get complete details. You'll find it always pays to investigate Dravo Heaters!

Dravo Corporation, Department A-1308
Fifth & Liberty Avenues
Pittsburgh 22, Pa.

I am interested in Dravo Heaters for _____

☐ Please send literature
☐ Please have representative call

DRAVO
CORPORATION
Pittsburgh 22, Pennsylvania
Representatives in all principal cities

Name_____

Company_____

Address_____

City_____ Zone_____ State_____

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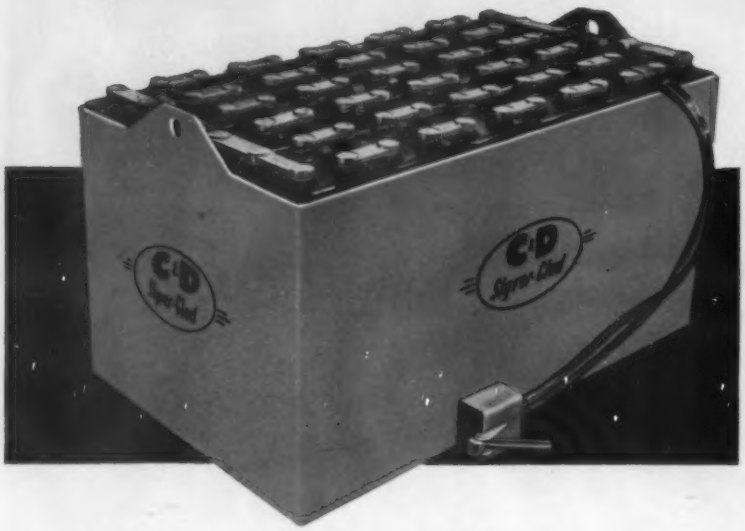
now!
more power than ever



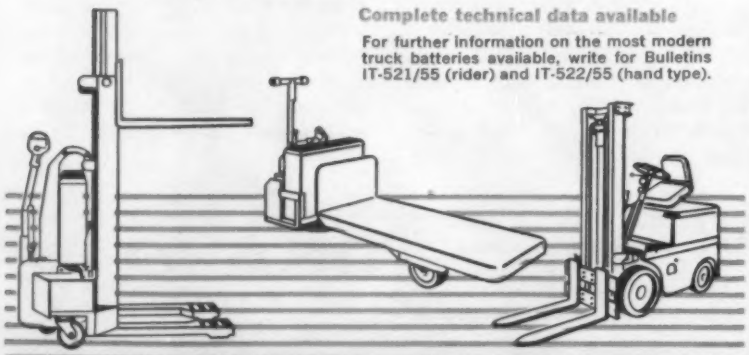
with C&D's new **66** and **125**
Industrial truck batteries

Ten years ago C&D pioneered two high capacity batteries—and the users of these batteries today represent a bluebook of American industry.

Now, after continuing research, development and testing, the newest additions to C & D's line of industrial truck batteries, the 66 and 125 are available. Now you can get at least 10% more capacity in standard size trays for your truck. *In truck operation, this means at least a 10% longer duty cycle.* Now, you can put the most modern maximum capacity industrial truck battery on the market today—C & D's Five-Fold Slyver-Clad* to work in your trucks. Remember—C & D Slyver-Clad Batteries move more tons—for longer periods! *T.M. Reg.

Complete technical data available

For further information on the most modern truck batteries available, write for Bulletins IT-521/55 (rider) and IT-522/55 (hand type).



C&D BATTERIES, INC.
of Conshohocken, Pa.
Industrial Batteries Since 1906
Sales and Service Offices in Principal Cities from Coast to Coast

For more facts circle 590 on Reply Card

NEW PRODUCTS

(Begins on page 130)

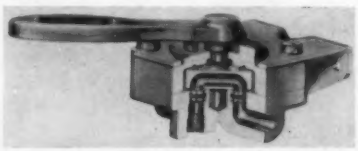
like its heavier brother, it requires only a hacksaw and wrench to erect. The channel is cut to length and bolted together from stock fittings and a special spring-held gripping lock nut. The new channels come in three sizes: A-1000, 1¼ by 1¼, 14 gage; A-4000, ⅝ by 1⅝ in., 19 gage; A-5000, 1¼ by 2½ in., 14 gage. They come in lengths of 10 and 20 ft. Unistrut Products Co.

19—GEARED MOTOR for the overhanging loads

Designed for overhanging or radial thrust loads, this open type geared motor is said to offer extra ruggedness, quietness, and dependability through use of double supported gear shafts running in sintered bronze bearings, heavy duty gears and output shaft, and helical pinion and gear in the first step. Bearings are assured long life lubrication through extra large oil wicks, manufacturer notes. A wide selection of base motors is available — synchronous or non-synchronous unidirectional, or non-synchronous reversible. These units offer starting torques up to 75 lb-in. and gear ratios from 4: to 30,000:1. Bulletin F-6841 gives further details. Barber-Colman Co.

20—AIR VALVES designed for range up to 250 psi

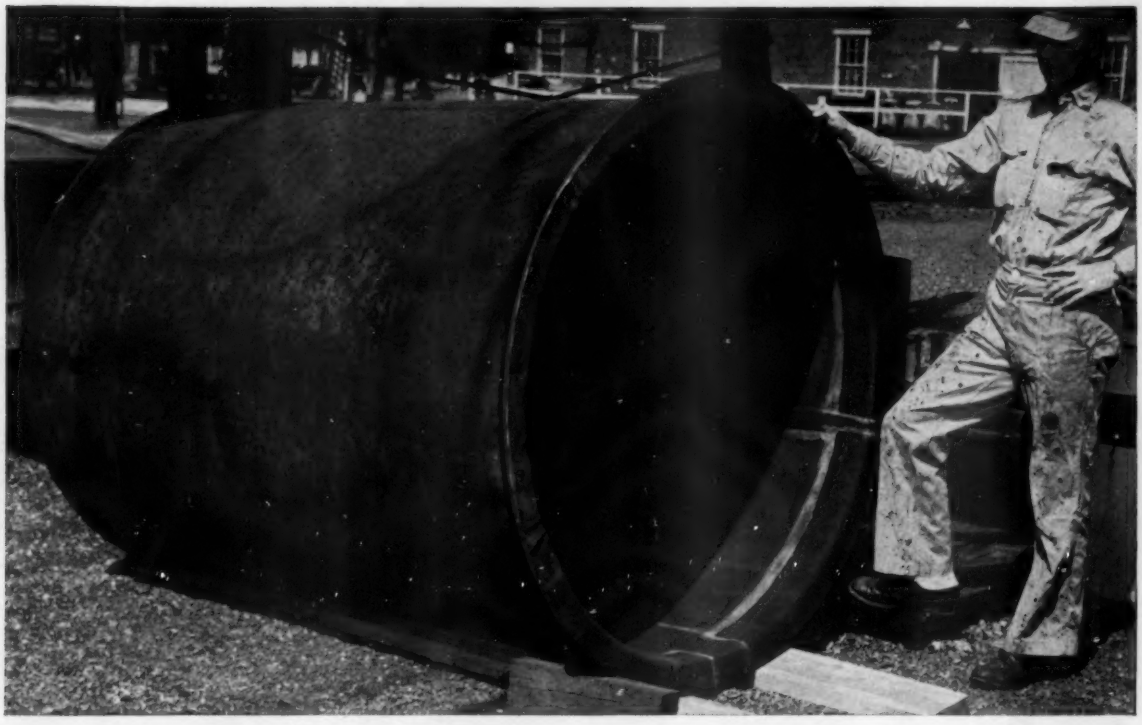
Model 2801 four-way air valve incorporates company's Shear-Seal principle, for the shop air range up to 250 psi, it is announced, making this principle available for low pressure service at a competitive price. Heretofore the standard lines of "Shear-Seal" valves were



designed for air pressures up to 2000 and 4000 psi. None of the efficiency of this principle has been sacrificed, company notes, in the new 250 psi series. Incorporated in the new design are a number of convenience features to make plumbing and mounting easier. For instance, any port may be used as pressure port and valve may be rotated in 90-deg intervals for most convenient piping. A sturdy mounting bracket is furnished with valve and it, too, can be turned where you want it. Valves come in ¼ and ⅜ in. port sizes. Barksdale Valves.

21—ANTI-FUME PELLETS to control chrome spray

Plating plants and departments can control chrome spray by dropping a few Smoothex Anti-Fume Pellets into the plating baths, says manufacturer of the pellets. They not only reduce plating



Tank linings of resilient Du Pont "HYPALON"® give maximum protection against strong oxidizing agents

NOW . . . linings of HYPALON, Du Pont's new chemical rubber, are commercially available for your use. Applied by standard lining methods for resilient materials, HYPALON tank linings can give much longer service on many critical applications. HYPALON is particularly resistant to deterioration from strong oxidizing agents. Chemicals such as chromic acid, sulfuric acid, pickling solutions and chlorine dioxide can be contained safely in equipment lined with HYPALON.

HYPALON is also more heat-resistant than any general-purpose elastomer, and it resists many of the other causes of failure in resilient materials. It won't crack from contact with ozone in any concentrations . . . withstands the effects of sunlight and weathering.

The tank shown above is used for storage of oxidizing solutions of calcium hypochlorite, and maintenance men have reason to expect a long, uninterrupted service life from the lining. Take a tip from them . . . when you need a tank-lining material that must have *extra-high resistance* to deterioration, try HYPALON chemical rubber. And be sure to ask your rubber-goods supplier about *all* the HYPALON products he sells. He'll be glad to show you the variety available.

USES FOR "HYPALON" INCLUDE:

HOSE—for handling strong acids and hot fluids

TANK LININGS—for storage of corrosive materials

GASKETS AND PACKINGS — for high-temperature service

PROTECTIVE COATINGS—over rubber, metal, wood, masonry

COATED FABRICS — for diaphragms, tarpaulins

MOLDED AND EXTRUDED PARTS — O-rings, tubing, miscellaneous parts

HYPALON®

CHEMICAL RUBBER

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. du Pont de Nemours & Co. (Inc.)
Elastometers Division, Dept. PL-8, Wilmington 98, Del.

Please send me your booklet on Du Pont "Hypalon." I am interested in these products_____

*Name*_____ *Position*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

For more facts circle 591 on Reply Card

. . . designed to harmonize with Detroit Technical Center

A special elevated water tank, of outstanding beauty, was erected for an installation north of Detroit. The 250,000-gal. elevated tank having an overall height of 138 ft., was designed, fabricated and erected by Chicago Bridge & Iron Company. Constructed of highly-polished stainless clad steel on the outside it harmonizes with the materials, architecture and landscaping of the Technical Center.

The stainless clad material for the tank required unusual and careful handling during fabrication, shipping and erection to keep the highly polished surface perfectly preserved.

CB&I has complete facilities for designing, fabricating and erecting elevated tanks of standard or unique design. Write our nearest office for further information.

Above: Looking up at the special three column stainless clad Horton® elevated tank. The tank proper is a true ellipse in elevation and is 46 feet in diameter.

CB&I

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston
Los Angeles • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY and GREENVILLE, PA.

NEW PRODUCTS

(Begins on page 130)

costs, it is announced, but also serve to protect health of plating room workers. Since each pellet weighs 1 oz, the operator needs only to count out 72 pellets to make up a 4-lb charge for a 100-gal tank. No weighing is necessary. Each pellet tends to keep the chromic acid in the bath, it is explained, preventing escape of fumes, spray and dragout. Company says the pellets will not break down under normal plating operation and, once a tank is charged, the occasional addition of a few pellets is all that's needed to maintain reduced surface tension. The pellets are also said to reduce heating costs, improve rinsing and drying operation, and lower tank contamination. Smoothex, Inc.

22—WALL PANELS for building exteriors

Designed for use as a building exterior, Pan-L-Wall is announced as economical and lightweight. These insulated wall panels are available in aluminum, steel,

stainless steel, rigidized metal, aluminized steel or fire-resistant asbestos-protected metal wall. According to manufacturer, panels have an insulation efficiency rating up to three times that of an 8-in. brick wall; construction costs, including both labor and materials, are lower than masonry; and all interior surfaces are protected against corrosion and discoloration due to electrolytic action and deterioration from condensation. American Steel Band Co.

23—CONTROL VALVE with adjustable throttling range

This company's Standard Type 10 is announced as an improved self-contained, single seat pilot-operated control valve with adjustable throttling range. It features easy conversion from a pressure reducing and regulating valve to a back pressure control valve by simply switching control piping. A dial-type range selector is used to select throttling range necessary to give most stable and sensitive control for particular process involved. Valve can be used with water, gas, air, light oils and refrigerants, including ammonia and Freon. It is sug-

Saves $22,000 a year

Planet Pusher-Bar Conveyor Pays for Itself in Eleven Months

At a leading automobile plant, loading scrap from trim presses on to railroad cars formerly required a two-man crane and magnet operation.

Now . . . two Planet conveyors move baled scrap to waiting railroad cars *automatically* . . . saving $22,000 a year!

The system, which now loads an average of 12 cars a day, is engineered to handle a maximum of 105 cars a day. The retractable conveyor permits easy movement of the railroad cars.

If your plant has a scrap handling problem, get in touch with a Planet Engineer. Whatever your plant layout, he'll show you an efficient, compact, and economical way to minimize your handling costs.

PLANET CORPORATION

1840 SUNSET AVENUE
LANSING, MICHIGAN

- CONVEYORS
- ENGINEERED SYSTEMS
- FOUNDRY EQUIPMENT
- AUTOMATION
- STEEL FABRICATION

For more facts circle 593 on Reply Card

SELECT

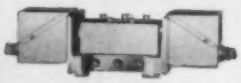
Quick-As-Wink®

AIR AND HYDRAULIC

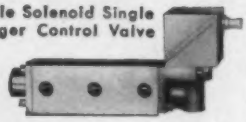
CONTROL VALVES

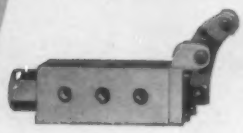
DESIGNED AND BUILT TO ASSURE

Double Solenoid "O-Type" Control Valve

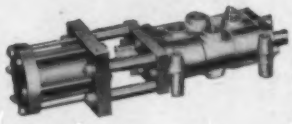


Single Solenoid Single Plunger Control Valve





Cam Operated "O-Type" Valve



Pilot Cylinder Operated Two Position Hydraulic Valve

efficient and dependable operation of your machines and machinery

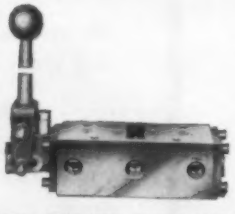
Can you afford to gamble with less?

• Why build — or buy — expensive machines and then restrict their output and risk breakdowns and production tie-ups because of inferior control valves?

Positive and fast acting Quick-As-Wink valves meet the most exacting requirements. They deliver dependable precision performance month after month and year after year. Machine operators, foremen, superintendents *and machine builder trouble shooters* will tell you that there is nothing better than a Quick-As-Wink valve. REMEMBER,— your efforts to increase production and cut costs can only be as successful as the air and hydraulic valves that control the operations. Don't gamble. Play safe. Specify Quick-As-Wink valves. Get full details. Write for Bulletin No. 531, *Today!*

Ask us also about . . .

FOOT OPERATED SLIDING SLEEVE VALVE ⅜" to 1" sizes. Single pedal spring return and two pedal designs. Operator has both hands free to handle the work.



LEVER OPERATED SINGLE PLUNGER VALVE ⅜" to 1½" sizes. Widely used for controlling single and double acting cylinders and as pilots for other valves.

Quick-As-Wink®

AIR AND HYDRAULIC

Control Valves

Hand, Foot, Cam, Pilot, Diaphragm and Solenoid Operated

Mfd. by C. B. HUNT & SON, INC., 2089 East Pershing St., Salem, Ohio

For more facts circle 594 on Reply Card

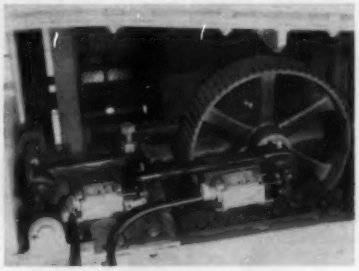
NEW PRODUCTS

(Begins on page 130)

gested for water systems, for altitude control, as an unloading valve on extrusion presses, for back pressure control and for oil refineries. It is available in iron, bronze, steel, with bronze or stainless steel trim, and monel trim on the pilot valve, and composition or metal seat. Sizes are from 2 to 12 in. with flanged ends, and from 2 to 3 in. with screwed ends. A. W. Cash Co.

24—VOLUMETER weighs material on moving conveyor

This Volumeter is designed to record the weight of material on a continuously moving conveyor even though it may stop at undetermined intervals. Relying on the constant volume of material being conveyed, unit can be calibrated to record integrations of any conveyor load. If

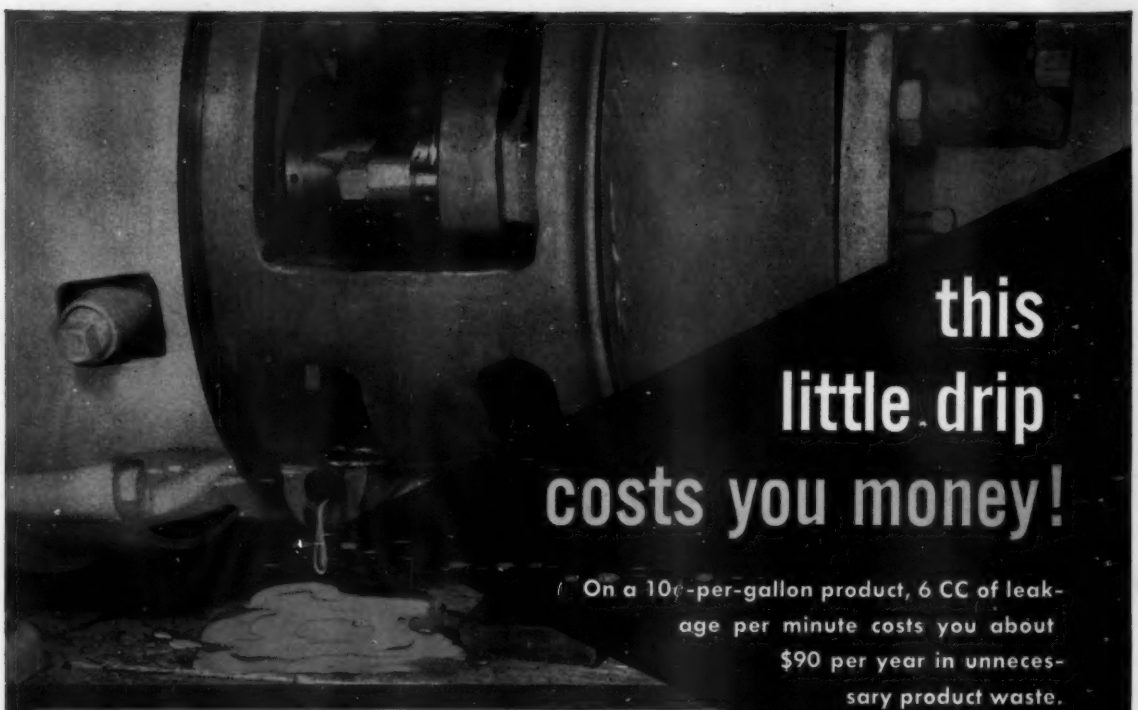


volume of materials should vary, manufacturer points out, the Volumeter automatically shuts down the conveyor.

No outside power is needed; the device is actuated by contact with moving material on conveyor. The unit is mounted on conveyor housing, and its wheel rides on the material being conveyed. A cam on the end of the shaft actuates a relay switch. The counting impulse thus produced is carried electrically to a remote counter, calibrated to record weight of material passing over conveyor. If the volume of material decreases, the wheel and, in turn, the stop screw on the yoke are lowered making contact with a limit switch which stops conveyor. The limit switch can also be set up to sound an alarm, and to actuate an air vibrator on the hopper feeding conveyor to relieve jamming. Bulletin R-35 gives data. Roto Div., Elliott Co.

25—AUTOMATIC FILTER uses diatomaceous earth

The Delpark-Olson Superflow Filter uses diatomaceous earth with tubular filter elements. Screen elements are precoated with diatomaceous earth forming a filter cake through which passes the fluid. Diatomaceous earth does not affect additives present in most oils and processing fluids, company points out. In this filter, cleaning is automatic and is accomplished within three minutes by back washing. The earth cake is knocked off and allowed to settle to the cone of the filter. Agitation in the



this little drip costs you money!

On a 10¢-per-gallon product, 6 CC of leakage per minute costs you about $90 per year in unnecessary product waste.

REPLACE PUMP PACKING WITH

BJ mechanical seals

Eliminate unnecessary stuffingbox leakage by installing a BJ Mechanical Seal. You not only realize important savings of pumped products but you also save on repacking and downtime losses. A BJ Mechanical Seal also prevents contamination of the pumped liquid ... protects against volatile and corrosive liquid hazards.

BJ MAKES A COMPLETE LINE OF MECHANICAL SEALS...

BJ makes reliable high-precision seals in material and construction combinations to answer almost any pressure, temperature and liquid requirements. This means that BJ can provide the *one best seal* for each specific pumping need. Ask your nearest BJ sales engineer to show you how Mechanical Seals can save you money. Or you can obtain further information by writing for BJ Bulletin No. 54-1-10,000.

BJ
SINCE 1872

Byron Jackson Co.
PUMP DIVISION

P. O. BOX 2017 TERMINAL ANNEX • LOS ANGELES 54, CALIF.

Sales Offices in Principal Cities

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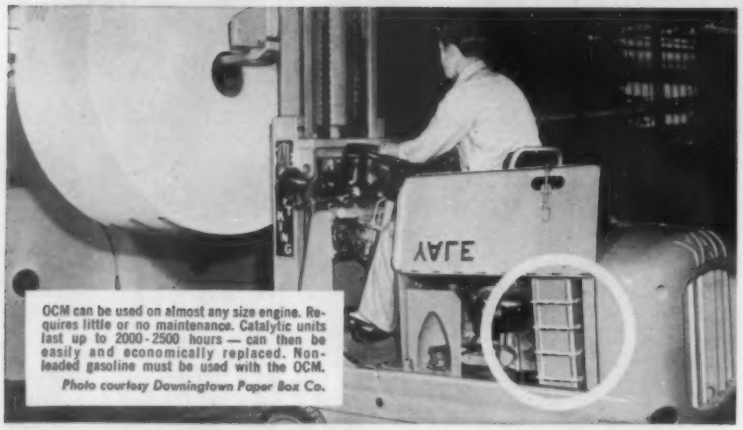


OCM can be used on almost any size engine. Requires little or no maintenance. Catalytic units last up to 2000-2500 hours — can then be easily and economically replaced. Non-leaded gasoline must be used with the OCM.

Photo courtesy Downingtown Paper Box Co.

KILLS DANGEROUS CARBON MONOXIDE FROM GASOLINE AND LP-POWERED EQUIPMENT

—Also Eliminates Hydrocarbons—

OCM CATALYTIC EXHAUST

Now you can operate lift trucks, bulk handling trucks, stationary engines — any type of gasoline- or LP gas-powered equipment — efficiently, safely, in even closely confined areas. For the OCM Catalytic Exhaust eliminates 95% or more of the deadly carbon monoxide, and 90% of the hydrocarbons, from the exhaust gases.

The OCM Catalytic Exhaust is made to replace standard engine mufflers. It's now available as optional factory-installed equipment from leading manufacturers, such as Buda, Clark, Yale & Towne, and Lincoln-Schlueter. Or it can be easily installed on present equipment by your own mechanics.

Wherever you operate gasoline- or LP gas-powered engines indoors — even part time — the OCM Catalytic Exhaust means an end to fume-caused headaches, eye irritation, and nausea. It means more efficient use of equipment, plus greater employee productivity and morale. Write now for complete information and the name of your nearest supplier.

FOR FORK TRUCKS

STATIONARY ENGINES

POWER SWEEPERS

OXY-CATALYST, INC.

WAYNE, PA., U.S.A.

MANUFACTURING • ENGINEERING • RESEARCH

Fume elimination processes and equipment for internal combustion engines — for incinerators — for consumer products — and for industrial air pollution control and heat recovery.

For Diesel Exhaust Fumes

New OCM Dieseler reduces below objectionable levels harmful, irritating exhausts from any 4-cycle diesel engine when running at or over 60% load. Write for details.

OXY-CATALYST, INC., Wayne 3, Pa.

Please send complete information on

- ☐ OCM Exhaust for gasoline engines
- ☐ OCM Dieseler for 4-cycle diesel engines
- ☐ Send name of nearest supplier

Name .....

Firm .....

Street .....

City ..... *Zone* ..... *State* .....

Inquirers in the U.S.A. or its territories, or in Canada, should write to Wayne, Pa. Inquirers elsewhere should write to Pan American Chemical Inc., 9 Rue La Perouse, Paris 16, France.

For more facts circle 596 on Reply Card

NEW PRODUCTS

(Begins on page 130)

cone acts to prevent sludge packing.

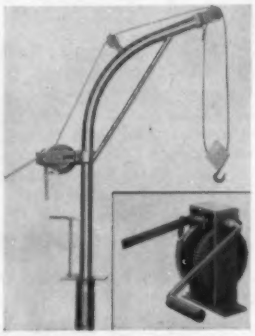
All operations are simple, it is noted, and the cleaning-out process, done without emptying the filter, is clean and easy. Announced as particularly applicable to coolants, cutting oils, hydraulic oils, industrial cleaning solvents and chemicals, this filter is available in capacities to 175 gpm. Industrial Filtration Co.

26—TRANSFORMERS for machine tool applications

This line of rugged duty transformers, announced for machine tool control panels, features three types ranging from 50-w to 1500-w. The three voltage lines are: 1-60 cycles for 230/460 v primary to 115 v secondary; 2-60 cycles for 575 v primary to 115 v secondary; 3-50/60 cycles for 230/460/575 v primary to 115/95 v secondary. According to company, automatic or semi-automatic machine tools require special transformers for control panels, and these transformers are designed for this use. Jefferson Electric Co.

27—CRANES, WINCHES to shorten truck loading time

These truck mounted cranes and hand operated winches are designed to save labor and shorten loading and unloading



time. The cranes are being produced in 500-, 1000- and 2000-lb capacities. They incorporate full circle swing to simplify one-man loading and handling. The winches are available in two styles, each 1000-lb capacity. One model has a 6-in. band-type brake and needle bearings. Both cranes and hand winches have steel cut gears and drop forged steel ratchet which is spring loaded. H. S. Watson Co.

28—STEAM GENERATOR is a compact 50 hp model

Designed to burn No. 4 oil, this 50 hp steam generator makes it possible for users with limited space facilities to cut fuel costs as much as 30 per cent, company says, due to price differential between No. 4 residual oil and light oils. The tiny boiler is said to operate at efficiencies of 80 per cent or better. Despite the fact it utilizes No. 4 oil, it

Drilling

Busting

Tamping

Plant maintenance can cost less with these Gardner-Denver air tools

They're designed to fit the work—to help you get your jobs done faster.

They're ruggedly built to stand the gaff—give long service with minimum maintenance.

Our many years of experience in building air tools for contractors, builders and plant maintenance men mean you get the best from Gardner-Denver. Write for descriptive bulletins.

Other maintenance tools by Gardner-Denver and Keller Tool

- Portable Air Compressors
- Trench Diggers
- Clay Spaders
- Sump Pumps
- Air Hoists
- Impact Wrenches
- Grinders and Sanders
- Air Line Lubricators

GARDNER-DENVER

Since 1859

KELLER TOOLS

THE QUALITY LEADER IN COMPRESSORS, PUMPS AND ROCK DRILLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
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REACHING THE HIGH SPOTS IS NO PROBLEM WITH AN . . .

Economy

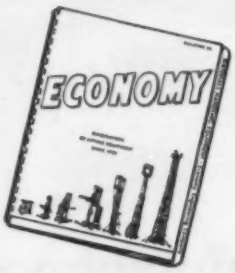
HI-REACH TELESCOPER

A man feels safe on an Economy Hi-Reach Telescoper and can work with relaxed attention to the job.

Stability, strength, and safety has always been our first consideration in engineering these machines. And we've been doing it for 54 years.

If you have a special overhead service requirement or need a material handling machine for a specific job, Economy engineers can build it.

Write for the new Catalog No. 55. Forty pages of pictures and suggestions for special and standard machines. Every plant manager and maintenance superintendent should have this catalog handy for reference.



The Economy Hi-Reach Telescoper shown here has a platform rise of 70 feet above floor level and a minimum lowered height to clear 12 feet. Through either of two push button stations the platform may be raised or lowered to any height. The machine shown is used for servicing lights, unit heaters and other overhead mechanical equipment.

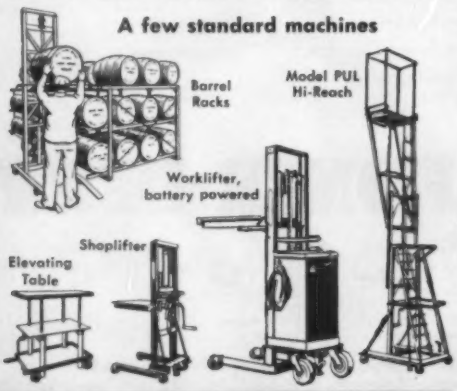
Service engineers in all principal cities

ECONOMY ENGINEERING CO.

4527 W. Lake St., Chicago 24, Ill.

New York Office 342 Madison Ave., New York 17, N. Y.

A few standard machines



For more facts circle 598 on Reply Card

NEW PRODUCTS

(Begins on page 130)

requires less than one-half the space of many 50 hp units. Boiler can be installed in 20 sq ft of floor area, and requires only 4 ft 8¼ in. of head room. Since no cement foundation is necessary to install this package boiler, it can be installed wherever fuel, water and electricity are available. Company engineers point out that multiple installations of the boiler can prove profitable in metropolitan areas, in plants having wide variations in steam load, in plants where space is limited, or to replace older, larger boilers of lower capacity without structural changes. Cyclotherm Div., National-U.S. Radiator Corp.

29—EXTINGUISHERS are wheeled engine units

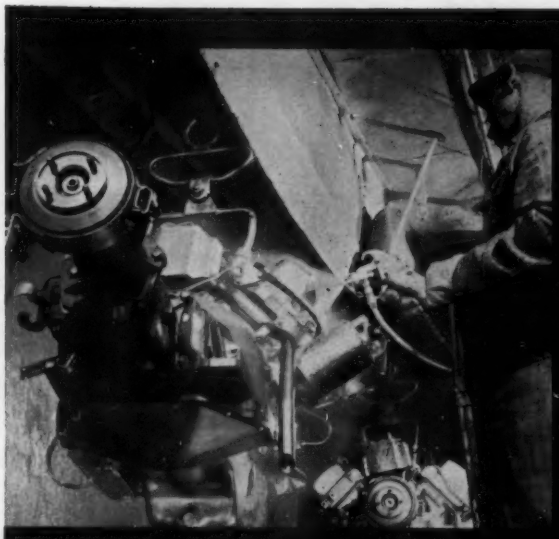
These carbon dioxide wheeled engine fire extinguishers are designed to blast out the bigger blazes in oil, gas and other volatile liquids as well as large live electrical fires. Cylinders on each of the engines are capped by lever operated

valves to permit immediate discharge of liquid CO_2 so that the engines can be put into action almost immediately. Manufacturer announces that the new engines are in production in 50-, 75- and 100-lb capacity models, all Underwriters' Laboratories approved. Frames are solid welded construction, and each unit is balanced for maneuverability.

The twin 50-lb cylinders on the 100-lb model (shown) can be operated independently of each other, or in tandem to let the operator make use of the maximum discharge by operation in tandem, or to use one cylinder at a time. Fyr-Fyter Co.

30—ACCESSORY for mist collector dispenses smoke

An exhaust shell is available for the standard Mistkop Mist Collector to collect and expel smoke from oil where heavy machine cutting is done. The Mistkop collects mist and vapors from cutting oil used as coolant, condensing it and returning it to the machining sump—this exhaust shell serves to remove the smoke through a pipe connection leading out of doors. The shell surrounds the filter portion of the Mistkop and is so designed



Spray-painting with aluminum at the Dodge Main plant of Chrysler Corporation, Detroit, Michigan. Working parts of engine not to be painted are covered with protective caps.

Finished Dodge "Red Ram" Engine, completely painted with gleaming coat of aluminum, ready for installation.

Chrysler improves engine protection with aluminum

...There's a place for aluminum paint in your operation, too

Chrysler Corporation is holding down costs while dressing up the engines in all of its 1955 model cars and trucks. This company finds that brilliant aluminum paint, pigmented with ALCOA Aluminum, is the most economical paint coating it can use to add sales appeal to these power plants. Spray-painted with aluminum, the engines have a brighter, cleaner, more attractive appearance . . . well protected against abrasion, heat, corrosion and rough treatment.

ALCOA does not make paint, but ALCOA Aluminum Pigments are used in more aluminum paints than any other brand. Special formulas have been developed by your paint manufacturer to solve individual problems. Paints made to these formulas actually cost less, last longer, give utmost protection against heat, cold, sun, rain, smoke and fumes.

Write today for the latest information on all types of aluminum paint and aluminum roof coatings. Use the coupon for copies of our FREE booklets, *Painting With Aluminum* and *Aluminum Asphalt Roof Coatings Make Time Stand Still.* They contain valuable information you can use.

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For more facts circle 599 on Reply Card

Here's why A. E. STALEY CO. has switched to cotton

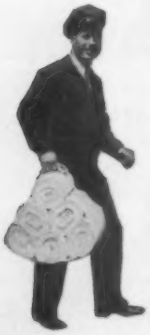
A. E. Staley Co. use Fairfax Towels supplied by the Decatur Clean Towel Service, Decatur, Ill.

Giant processor of corn and soybeans for a multitude of markets, A. E. Staley now maintains 108 buildings on its Decatur, Ill. plant site. This factory complex calls for high standards of skill and efficiency. Staley insures these standards *in every way*. Inevitably that includes washrooms equipped with clean cotton towels.

In the words of the company: "We first installed cloth towels in 1951, estimating a saving of $9 per month per cabinet for locations given heavy use. Today, we have switched entirely to cotton in our plant and office buildings—248 installations in all."

At Staley, cotton toweling has eliminated disposal problems. It keeps washrooms sanitary with less expense, fewer plumbing repairs, no inventory headaches. And Staley employees appreciate cotton's absorbency and soft "at-home" quality.

From office buildings to plants to institutions—pride and profit point to cotton. A free booklet explaining cotton towel service is yours on request. Write: Fairfax, Dept. P, 65 Worth St., N. Y. 13, N. Y.



Here's How Linen Supply Works...

You buy nothing! Your linen supply dealer furnishes everything at low service cost—cabinets, pickup and delivery, *automatic* supply of freshly laundered towels and uniforms. Quantities can be increased or decreased on short notice. Just look up LINEN SUPPLY or TOWEL SUPPLY in your classified telephone book.

Clean Cotton Towels...

Sure Sign of Good Management

Fairfax Towels

A PRODUCT OF WEST POINT MANUFACTURING CO.

WELLINGTON SEARS CO., SELLING AGENTS, 65 WORTH STREET, NEW YORK 13

For more facts circle 600 on Reply Card

NEW PRODUCTS

(Begins on page 130)

that loss due to air friction is kept to a minimum, so that enough pressure is available in the fan of the collector to force the smoke out of doors without auxiliary fan equipment. Oil mist is retained in the collector to be returned to the cutting operation. Aget Mfg. Co.

31—SCREW KIT holds assortment of 21 sizes

Called a Handy Andy, this kit contains a two gross assortment of 21 most popular sizes of all-purpose self-tapping screws, proportioned according to the sizes most frequently used. The screws are nickel plated steel with lustrous finish and there's an index on the inside of the kit for ready identification of each size screw. J. A. Sexauer Mfg. Co., Inc.

32—L-P GAS PLANTS, self-contained, packaged units

Vaporizers, vaporizer-mixers, and mixers are included in this line of automatic packaged L-P gas plants. Outside power is not normally required, because they are self-contained and designed to operate at pressures from 1 to 5 lb, depending on heating value of the mixed gas. It is noted, however, that where higher pressure mixed fuel is required or low pressure liquid used, electrical power may be needed for auxiliary pumps.

Standard and high pressure vaporizer-mixers are made in sizes from 1000 to 50,000 cu ft per hour. Vaporizers are direct fired, steam, electric or hot water heated. Mixers and vaporizer-mixers use the venturi tube principle for operation. Their purpose is to take butane or propane and mix it with air to produce a gas of any predetermined Btu content. Gas delivered from these units may be used to operate natural or manufactured gas type appliances after they have been set to deliver gas with the proper characteristics to replace the gas for which the appliances have been set. It can also be mixed with natural gas, coal gas, or water gas, when the same conditions apply. Bulletin GP-150 gives details. American Liquid Gas Corp.

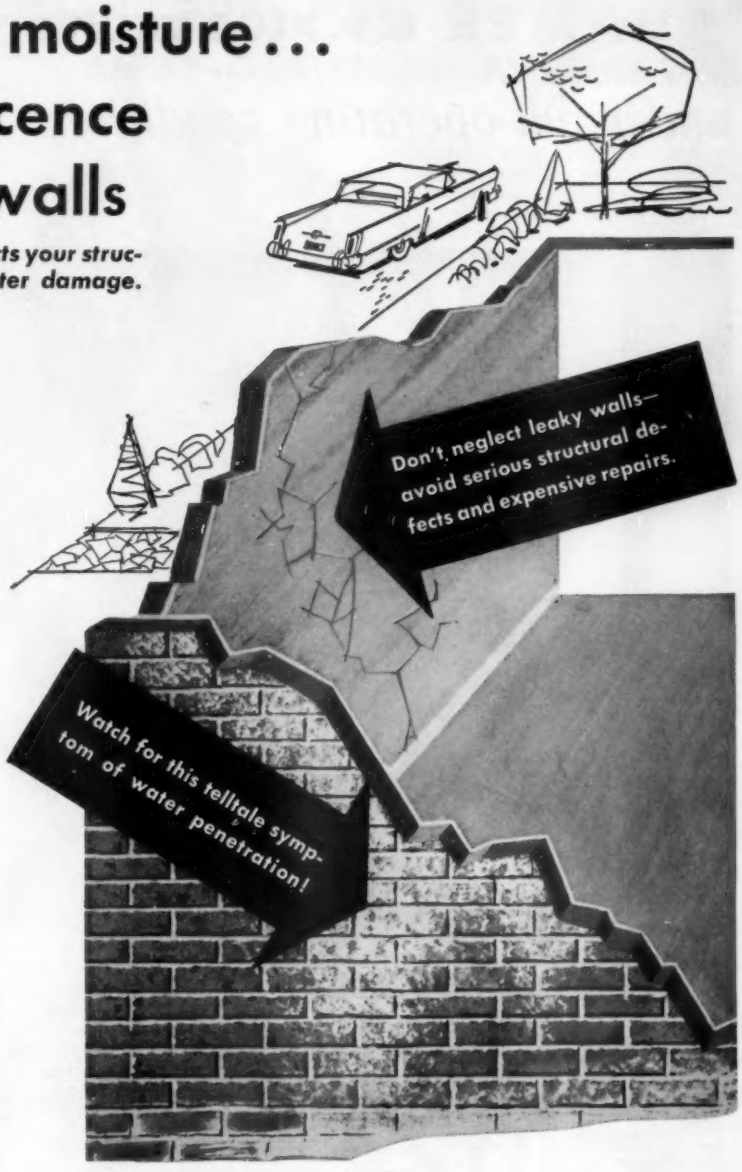
33—ROLL HANDLER equipped for cylindrical loads

To help solve handling problems posed by cylindrical loads, this company announces a specially designed pallet-type roll-handling unit. The roll handler is an operator-led, electric-powered truck equipped with a pair of forks for handling cylindrical loads. These forks are heavy duty concave members made so that they can straddle drums, reels, cylinders, paper rolls. An electric lift mechanism then raises the forks four inches, enabling truck to pick up cylindrical loads and transport them to desired location. The unit can be furnished with different overall fork widths and lengths to accom-

DEHYDRATINE NO. 22

seals out moisture... stops efflorescence on masonry walls

Silicone base water repellent protects your structures from inside and outside water damage.


Don't neglect leaky walls—avoid serious structural defects and expensive repairs.
Watch for this telltale symptom of water penetration!

Dehydratine No. 22 is no ordinary "surface" repellent. It functions on the principle of "negative capillarity" *in depth*. The highly penetrating characteristics of Dehydratine No. 22 set up a valve-like action within the masonry that permits vapor to escape *outward*, but stops the capillary absorption of solid drops of moisture from passing inward.

Dehydratine No. 22 reduces soiling and discoloration

Dirt and soluble stains cannot enter the pores of masonry treated with Dehydratine No. 22. Thus foreign particles trapped on the surface are readily washed off by rain. Owners and operators of concrete or light-colored stone buildings find that this saves money by eliminating difficult and expensive cleaning operations. Since Dehydratine No. 22 is effective against "white bloom" or efflorescence, it preserves the original beauty of the exterior without changing the color or texture of the surface. It pays to protect your structures against *inside* and *outside* water damage with Dehydratine No. 22.

A Subsidiary of Sun *Chemical Corporation*

HORN

A. C. Horn Co., Inc.

Long Island City, Los Angeles, San Francisco, Atlanta, Houston, Chicago, Toronto

FREE INFORMATION

A. C. HORN COMPANY, INC.
Dept. H2-85, 10th Street & 44th Ave., L. I. C. 1, N. Y.

Please send me more information on Dehydratine No. 22.

Name_____

Company_____

Address_____

City_____ State_____

DIVISIONS OF SUN CHEMICAL CORPORATION

HORN • **HUDSON** • **WILLEY** (paints, maintenance and construction materials, industrial coatings) • **WARWICK** (textile and industrial chemicals) • **WARWICK WAX** (refiners of specialty waxes) • **RUTHERFORD** (lithographic equipment) • **SUN SUPPLY** (lithographic supplies) • **GENERAL PRINTING INK** (Sigmund Ullman • Fuchs & Lang • Eagle • American • Kelly • Chemical Color & Supply Inks) • **MORRILL** (news inks) • and **ELECTRO-TECHNICAL PRODUCTS** (coatings and plastics)

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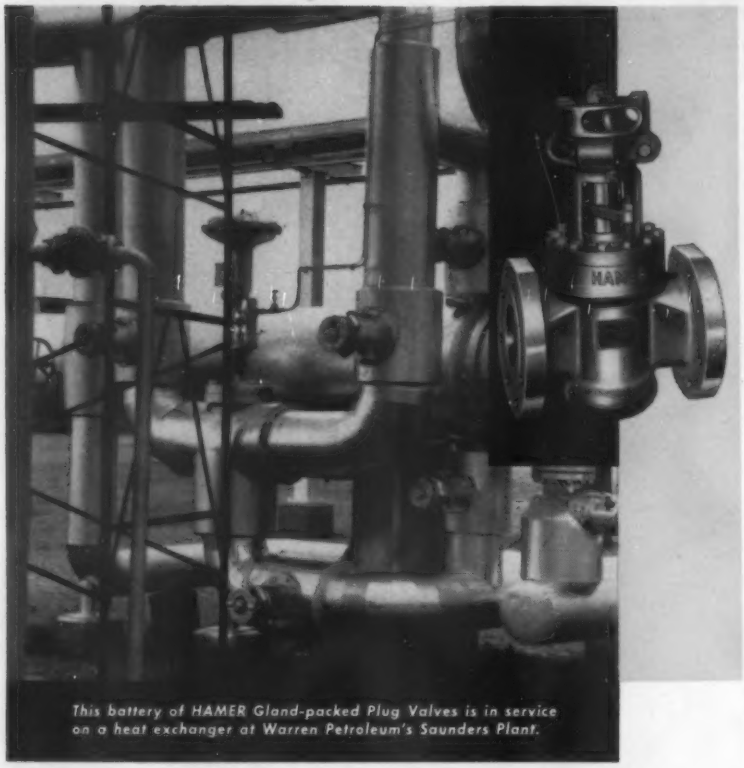
You can repack

HAMER G. P. PLUG VALVES

under full operating conditions



This battery of HAMER Gland-packed Plug Valves is in service on a heat exchanger at Warren Petroleum's Saunders Plant.

HAMER Line Blind Valves

Built for strength and durability, Hamer Line Blind Valves are the modern means of blinding pipe lines quickly and effectively. A one-man, one-minute operation. Cuts costs, and speeds up operations.

Shutting down to change valve packings costs dearly in time and money. That's why Warren Petroleum uses Hamer gland-packed Plug Valves. Not only can Hamer gland-packed plug valves be repacked under full operating conditions, but because of the exclusive plug adjusting nut, a feature of all Hamer Plug Valves, the valves can't stick or freeze. No matter what the time lapse or service you have positive E-Z turn control at all times.

Send for FREE Catalog

HAMER VALVES, INC.

2919 Gardenia Ave., Long Beach 6, Calif.

Representatives throughout the World

For more facts circle 602 on Reply Card

NEW PRODUCTS

(Begins on page 130)

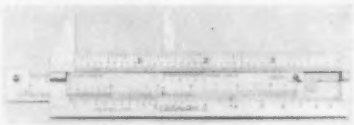
modate loads of different length and diameter. Two standard models have capacities of 4,000 and 6,000 lb. Automatic Transportation Co.

34—CONVEYOR BELT is extra strong, pliable too

Reinforced with a new synthetic fabric called Super Raynile, this conveyor belt is claimed to be 400 per cent stronger than most cotton reinforced belts. It has been developed for transporting coal, ore, crushed stone and other bulk materials over long distances and up steep grades. Despite its high strength, this belt is pliable and flexible, says manufacturer. It is claimed less expensive than steel-reinforced belts and can be spliced quickly and economically in the field without special equipment. It will be manufactured in widths up to 72 in. and will come in thicknesses ranging up to 15 plies. Hewitt-Robins Inc.

35—INSTRUMENT for measuring and computing

Pocket sized, the stainless steel Caliputer is designed to combine functions of a vernier caliper, depth gage, and slide rule computer in a single, inexpensive unit. It measures 4½ in. long, 1½ in. wide and $\frac{7}{16}$ in. thick. The Caliputer also provides direct readings of circumferences and



other cross section areas, says manufacturer, and permits easy calculating of other information. For example, a machinist can read directly the correct speed for a lathe in rpm's by setting the rule to the diameter of the stock being used and by supplying proper feed rate. Company says readings of the caliper and depth gage are accurate to 0.001 in., the linear scale is graduated to thirty-seconds of an inch, and the slide rule performs all multiplication, division, square and square root calculations. The Caliputer retails around $8.00. Jet Air Engineering Corp.

36—LUBRICATOR for use with abrasive grinding belts

This automatic lubricator is claimed to be more compact and to offer more accurate control than many spray devices for increasing the life of grinding belts. The standard unit consists of an adjustable stroke pump driven by a reciprocating air motor and incorporating a spray control cylinder that triggers the air only when the fluid is being delivered to the spray nozzle.

Controls are provided to regulate frequency of application, amount of lubricant pumped per stroke, and air pressure at the nozzle. The unit has a 2-gal lubri-

NEW PRODUCTS

(Begins on page 130)

cant storage tank piped to the liquid cylinder and comes complete with fittings, nozzle and air regulator with gage. The standard unit is suggested for belts to 8 in. wide. Larger belts can be lubricated by more pumping units. Manzel.

37—PAPER TOWELS offer new dispensing method

Fanfold Towels provide what amounts to a never-ending supply of paper toweling. A simple application of self adhesive spots on the top and bottom of each package enables newly placed packages to adhere to the top of the previous package. Once the towel cabinet is threaded, it doesn't have to be rethreaded, says manufacturer; the cabinet doesn't have to be empty before being reloaded—it may be reloaded whenever the attendant checks the cabinet. West Disinfecting Co.

38—BALL BEARING UNIT has two-bolt flange

Interchangeable with the four-bolt flange units in this company's Sealmaster line, this new bearing also incorporates the same design features, including "zone hardening" and labyrinth seal. It is available in shaft sizes from ½ to $2\frac{3}{16}$ in. On new installations, the two-bolt flange bearing eliminates two fasteners, as well as the punching or drilling of two mounting holes. Also, it cuts installation costs and permits closer bearing spacing on multiple shaft installations. As a replacement bearing, this new Sealmaster unit fits the diagonal bolt centers on present four-bolt base flange units and carries the same load rating for a given size. Bulletin SS-125 gives further information. Stephens-Adamson Mfg. Co.

39—TAPE HOLSTER holds rule on your belt

Designed to save wear and tear on a plant engineer's pocket, the Tape-Hold Pocket Saver Holster offers a good way to keep a steel tape rule handy. It slips over the belt—two slots hold it in place. Made of cowhide, it comes in two sizes: one for 8-ft (½ in. wide) tapes, and one for 10-ft (¾ in. wide) tapes. It costs around 50 cents. Bauer-Lee & Co.

40—AIR CONTROL VALVES come in three types

Of three new air control valves announced, the Model 6668 is a solenoid bleeder, air cylinder-actuated, two- or three-way unit. It is designed for electric push-button control of bleeder and pilot-operated master valves. Removing plug in lower port makes the two-way valve into a three-way valve. Varnish-impregnated coils for 115- or 230-v, 50- or 60-cycle, a-c continuous duty are standard, but other voltages and cycles, including d-c, are available.

Algas engineered protection

MEANS MORE WHEN YOU CONSIDER AN LP-GAS STAND-BY PLANT

ALGAS installation at Ford Motor Co. Milpitas, California

Industrial firms install LP-Gas stand-by plants for one purpose . . to assure year 'round gas supply during shortage of natural gas or sudden interruption of service.

There's a big difference in operating costs and performance in LP-Gas stand-by plants. This difference lies in how well the system is engineered for the plant it is to serve. Backed by nearly a quarter of a century of experience, ALGAS LP-Gas plants provide maximum economy and trouble-free performance from every point. ALGAS equipment is specifically engineered for each plant.

Whatever your application may be, you can purchase ALGAS equipment to fit your requirements on an economical basis. Plants start with tanks of 1,000 gallon capacity and range upward. Our engineering staff is at your disposal to offer recommendations for the type and capacity of equipment which your plant requires. Mail the coupon below for complete information.

★ NO MORE PRODUCTION SHUT-DOWNS

★ NO ADDITIONAL LABOR OR MAINTENANCE REQUIRED

★ DEPENDABLE YEAR 'ROUND PERFORMANCE

BUTANE ALGAS PROPANE
NATURAL GAS

Your seal of approval in the LP-Gas industry

AMERICAN LIQUID GAS CORPORATION
1109 Santa Fe Avenue
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American Liquid Gas Corporation
1109 Santa Fe Ave., Los Angeles 21, Calif.

Please furnish us complete information regarding your LP-Gas stand-by plant equipment.

Firm_____

Address_____

City_____ Zone___ State_____

For more facts circle 603 on Reply Card

KROEHLER CHAIRS
are "sitting pretty" on
IMPERIAL BELTING

■ Chairs and sofas produced by the famous Kroehler Manufacturing Company ride on a 638-foot Imperial Standard Rexall belt through the Kankakee, Illinois, plant. This long belt speeds manufacturing operations. It is economical because it is long-wearing. It gives top-most operating satisfaction because Imperial Standard Rexall is expressly adapted to the work. Write for case histories of other Imperial job-adapted brands and tell us your belting needs for conveyors and elevators. Whatever your need, there's an Imperial belt best adapted to do your work . . . better and longer!

You expect more from Imperial and you get more!

Imperial
INNER LOCKED
BELTING
First in stitched canvas belting for over 45 years

Imperial Belting Company

1759 S. Kilbourn Avenue
Chicago 23, Illinois

For new conveyors and elevators, specify and insist on Imperial for lowest ultimate belt cost. Write for Catalog 54-3.

For more facts circle 604 on Reply Card

NEW PRODUCTS

(Begins on page 130)

Model 6669 is a dual-control two-way valve, similar to the Model 6668, except that it has two exhaust openings which permit bleeding both ends of master valve alternately. This provides automatic reversal when electric current to solenoid is shut off, it is pointed out. Model 6678, a four-way two-position valve is electric push-button, limit switch, timer, etc., controlled for operating double-acting air cylinders. Maintained contact of control switch is required to direct air flow "out" lower cylinder port. Release of switch interrupts electric current to solenoid and directs air flow "out" upper cylinder port and exhausts cylinder at lower port for reversal. Other features are the same as Model 6668. Drawings and complete data are in Catalog 100-4. Logansport Machine Co.

It's easy to obtain product data with the postage-free Reader Service Cards provided on pages 161-162. Use them for information on advertised products, too. Just circle the key number appearing at bottom of the ad.

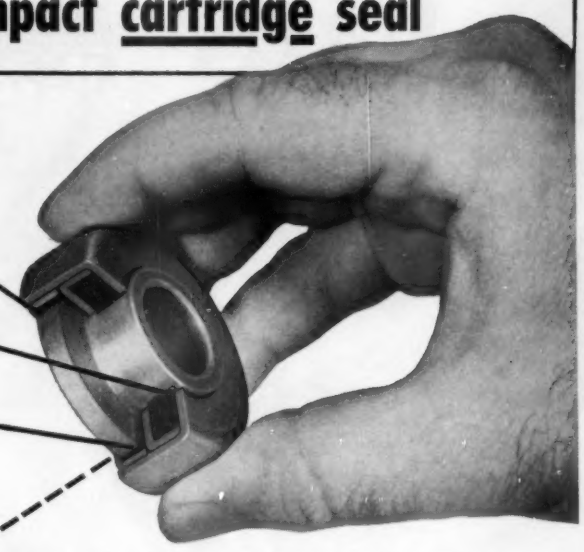
41—POWDERED LUBRICANT for metal-to-metal use

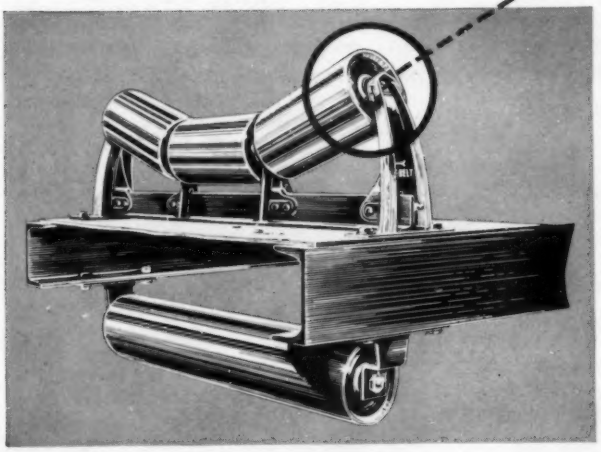
For lubrication of metal to metal parts which are tight fitting or where force fits are needed, Acrawax C Atomized is offered. A finely powdered lubricant, it is announced as non-tacky, non-corrosive, insoluble in water, oil and solvents. It is said to have a belting point of 285 F and to be a good dielectric. Useful under a wide range of temperatures, company says this lubricant also offers interesting properties under extreme pressure conditions. Due to its fine particle size, this synthetic wax can be applied by dusting or dipping. Glyco Products Co., Inc.

42—PRIMER-SEALER, fast drying pigmented polyvinyl

Developed for use under alkyd finishes, this pigmented polyvinyl primer-sealer is reported to dry in 3 hr. It prepares new cured plaster, painted surfaces, and brick and concrete for the application of semi-gloss, gloss, flat oil paints and enamels. Manufacturer recommends this sealer especially for wood because it lays down wood fibers. It is also suggested for dry wall construction, including plaster board, gypsum board, and fiber board insulation. Preparation of surfaces for watermixed paints, including latex paints, is also reported practical with the new sealer, if allowed 24 hr drying time. Company says the sealer is non-flammable, works easily and covers up to 500 sq ft per gallon. Luminall Paints, Div., National Chemical and Mfg. Co.

For longer idler life . . . here's 3-WAY protection in ONE simple, compact cartridge seal





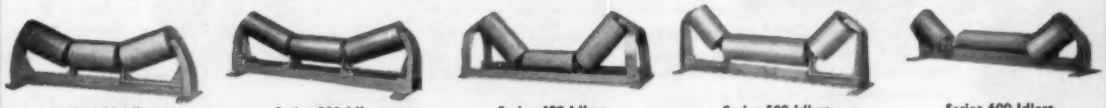
THE effectiveness of Link-Belt cartridge grease seals in protecting belt conveyor idler bearings is matched by no other in industry. Besides the normal high efficiency of Link-Belt's labyrinth and contact seals . . . grease within the labyrinth further prevents entry of dirt or other particles. This cartridge (see above cutaway) is one integral unit—no springs, no loose washers . . . no possibility of metal-to-metal contact. From shaft to shell—bearings, fittings, rolls, frames, even hex nuts are designed for long, trouble-free life.

Also important, you can always find the *right* idler in industry's most comprehensive line—over 500 idlers in 34 types, built in a broad range of roll diameters and belt widths with matching return idlers. Ask your Link-Belt sales representative or authorized stock-carrying distributor for 48-page Book 2416, which covers this broad line thoroughly.

LINK-BELT

BELT CONVEYOR IDLERS

LINK-BELT'S superior grease seal is standard throughout industry's most comprehensive idler line



Series 100 Idlers
Continuous service for all but heaviest and coarsest materials.

Series 200 Idlers
Continuous service for heaviest and coarsest materials.

Series 400 Idlers
Continuous service for maximum volume per lineal foot of belt.

Series 500 Idlers
For greater volume than series 100 at maximum economy.

Series 600 Idlers
For grain and similar materials requiring only light belts.

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office, New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World. 13,808

For more facts circle 605 on Reply Card

BECAUSE IT'S NO BONE . . .

IT'S TRAMP IRON! And the operators of a large Midwest plant were sadly surprised when they found this hard, hard "iron bone" in their damaged crushing equipment.

A Dings Magnet would have stopped it. There's one that can stop tramp iron that's causing trouble in *your* plant.

Why not talk to the Dings people—take advantage of over 50 years of leadership in the field of magnetic separation—you'll find the cost of magnetic protection mighty low compared to that of tramp iron damage.

Dings

DINGS MAGNETIC SEPARATOR COMPANY
4766 WEST ELECTRIC AVENUE
MILWAUKEE 46, WISCONSIN

MAIL THIS COUPON TODAY

DINGS MAGNETIC SEPARATOR COMPANY TI1553½
4766 West Electric Avenue, Milwaukee 46, Wisconsin
Please send me further information about Dings Magnetic Separators for protection against tramp iron.

Your Name_____ Title_____
Company Name_____
Address_____
City_____ Zone_____ State_____

For more facts circle 606 on Reply Card

Work Simplification

(Continued from page 97)

mon problem of adjusting to various truck heights at its shipping dock. Safety of personnel was jeopardized because dock plates sometimes slipped, loads were dumped and time and energy was spent in reloading and in blocking and reblocking. Sometimes the slope from the blocking was of such a degree that three men would be needed to load the skids into the truck, with a lot of pushing, pulling and maneuvering. To eliminate the pushing and pulling, the company had a "floating dock" built.

In addition to taking care of the various truck heights, the dock affords greater safety to the personnel. Also, an electric truck was obtained to replace the hand lift truck formerly used. Now, one man will walk a heavy skid of paper into the truck whereas it took three men to push the load before.

Protective Measures

In the booklet previously mentioned "Improving Materials Handling in Small Plants," the following protective measures are suggested since they apply almost universally:

Special racks should be prepared for any part which has a finely finished surface, or on which the external dimensions must be held to very close tolerances.

Special containers should be on hand for dangerous chemicals and for materials which are easily contaminated.

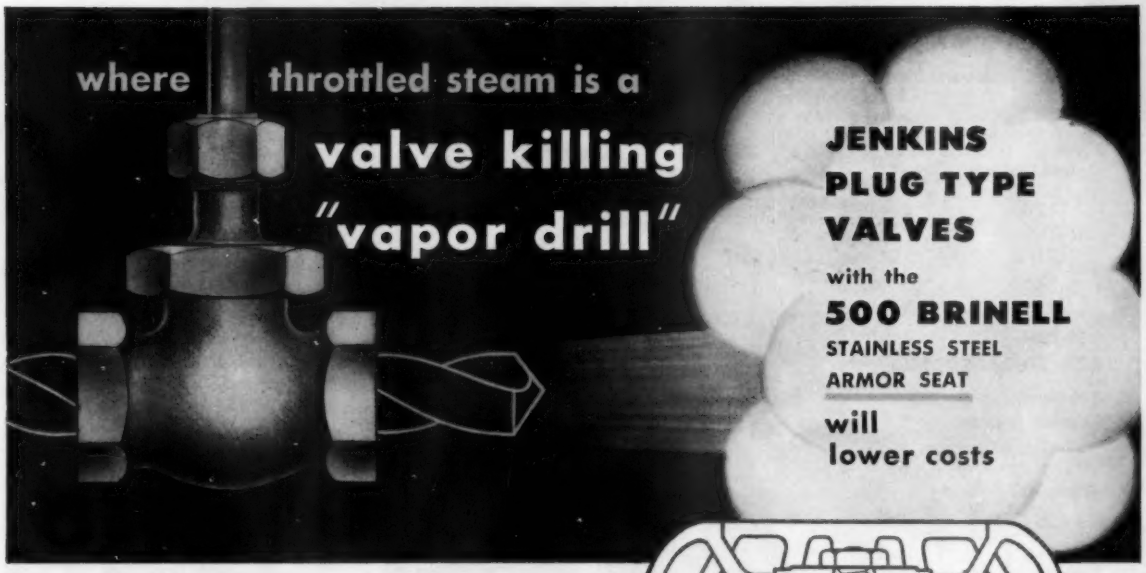
Methods for loading racks and bins should be carefully spelled out and frequent checks should be made to make sure such equipment is not overloaded.

Products which require special handling — either because they are hazardous or are readily damaged—should be clearly labeled, perhaps with a bright colored sticker; and operators should be trained in the proper method for handling such materials.

Finished parts should be removed from work areas as soon as possible—as soon as a rack or bin is filled.

In storage areas, metal corners can be provided for stacked material to minimize damage from bumping. A sheet of steel, about 3 ft square, bent in the center at right angles, will do the trick. In addition, bumpers can be installed on trucks and other mobile equipment to minimize damage to stacked parts and other equipment they may hit.

In the stores and shops department of Cleveland Electric Illuminating Co., rope was stored in cartons and whenever it was needed, the carton had to be rolled into the aisle and the rope



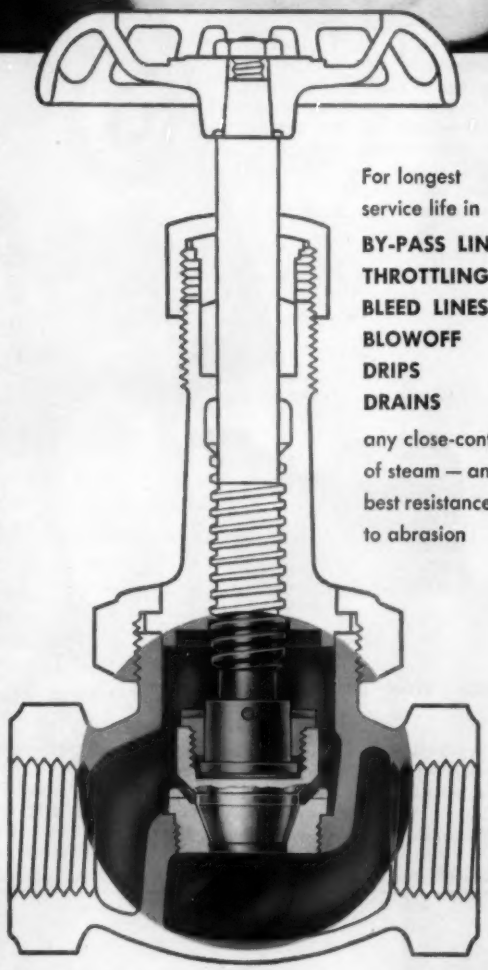
Closely regulated steam erodes grooves in seating units and drastically cuts service life of ordinary valves.

Jenkins Plug Type Valves have been engineered in every detail for maximum wear in such valve-killing service. The stainless steel Armor Seat defies the "vapor drill", and Jenkins quality throughout gives them top rating for wear-proof and trouble-proof perfomance.

Make you own test . . . in your toughest steam service . . . or anywhere that abrasion or erosion causes frequent valve failure. Compare, part for part, with any similar valve. You'll find that, again, Jenkins *extra value* pays off in longer life and lower maintenance cost.

Plug and seat ring are Jenkins JX500, a Stainless chromium alloy steel made to Jenkins high strength specifications, heat-treated to 500 Brinell. Seating surfaces are super-hard and mirror-smooth, offer highest resistance to galling, cutting, abrasion, and erosion. Wide, steep, 30° total taper permits extremely close regulation of flow and vapor-tight closure.

The Stainless steel plug is securely fastened to the spindle with a bronze locknut. Spindle is aluminum bronze with a tensile strength exceeding 70,000 lbs., — has high corrosion resistance.



For longest service life in
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THROTTLING
BLEED LINES
BLOWOFF
DRIPS
DRAINS
any close-control of steam — and for best resistance to abrasion

300 lb. 200 lb. 150 lb.
GLOBE and ANGLE

For complete information call your Jenkins Distributor — ask for Form 202. Or write: Jenkins Bros., 100 Park Ave., New York 17.

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LOOK FOR THE JENKINS DIAMOND
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Jenkins Bros.

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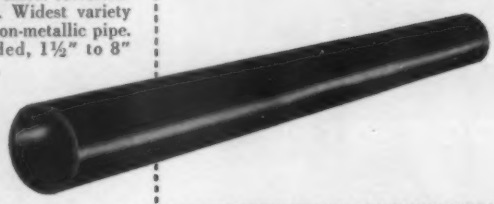
OLDEST PLASTIC PIPE STILL "TOPS"

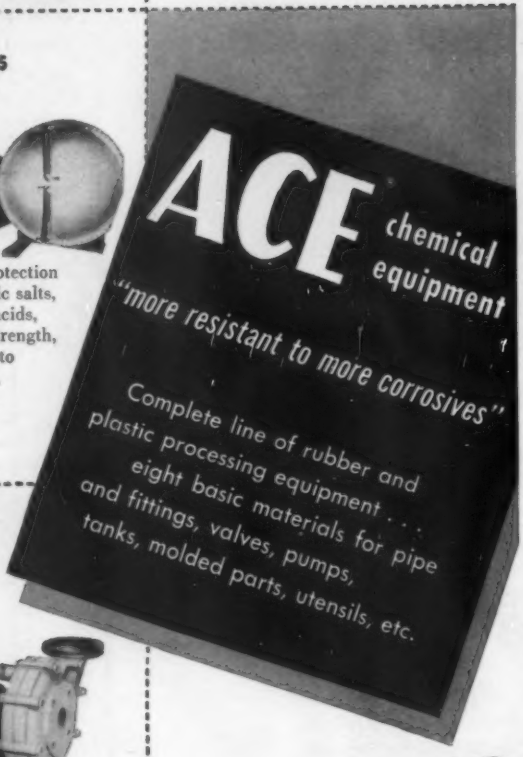
ACE hard rubber . . . now more than a century old . . . long the finest corrosion-resistant pipe available. Widest variety of fittings of any rigid non-metallic pipe. Sizes ¼" to 8" threaded, 1½" to 8" flanged. *Bulletin CE-51.*

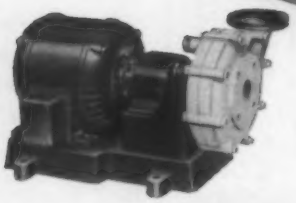


LIFE-TIME
ACID STORAGE TANKS

Rubber-lined by ACE
2-layer system

Economical, universal protection against all alkalis, metallic salts, practically all inorganic acids, hydrochloric acid any strength, sulphuric to 50%, nitric to 20%, phosphoric to 75%. Good to 160 deg. F. . . . sometimes higher. Soft rubber interlayer aids shock resistance.


ACE chemical equipment
"more resistant to more corrosives"
Complete line of rubber and plastic processing equipment . . . eight basic materials for pipe and fittings, valves, pumps, tanks, molded parts, utensils, etc.



ACE "WAM" . . . THE FINEST
Non-metallic Acid Pump

On job after job, this 80-gpm. centrifugal pump has earned highest praise. Hard rubber casing and impeller, Hastelloy C shaft. Handles nearly all corrosives. Mechanically simple, trouble-free. *Bulletin CE-55.* Larger ACE pumps available.

TOUGH ACE-ITE PLASTIC PIPE

General-purpose moderately priced rubber-plastic pipe handles most common chemicals to 170 deg. F. . . . except few strong acids and organic solvents. Tough, odorless, tasteless. Rigid pipe ½" to 6". *Bulletin 80.*

ACE rubber and plastic products

AMERICAN HARD RUBBER COMPANY
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pulled out of the carton to measure the required amount. By utilizing a wire-cutting rack and placing eyebolts on the crossbars, it is now possible to reach and dispense the rope without moving the carton.

Frank Glavan, of Cleveland Electric, proposed rounding off the ends of the forks on lift trucks, Fig. 3, to simplify the task of moving pallets. Experience has shown that this permits faster handling of pallets in that there is a greater tolerance for alignment when approaching the pallet. The rounded ends permit the forks to slide into place on an approach where the squared ends would catch on the pallet.

In another case a sling, with a spreader bar to fit pallets, was made and attached to the crane at one of the company's warehouses. This has eliminated loading and unloading material on the pallets by hand.

R. Cress, who suggested the sling, also proposed a 6-ft rod with hooks on both ends for removing loaded pallets from trucks. The rod is hooked on the pallet and lift trucks, enabling the lift truck to pull the pallet to the rear of the truck.

Employing a pump and spray outfit in the company's building construction department now permits heavy insulating material to be applied to cold-water lines directly from 55-gal drums. This eliminates the messy trowelling, insures proper coating thickness, saves material formerly lost in the many 5 gal pails used, and makes work easier.

Self-Testing Standby Unit

(Continued from page 87)

fers check (and replace) the Bristol graph only once every 30-days. They then check the supply of oil, water and fuel—and the standby is locked up for another month.

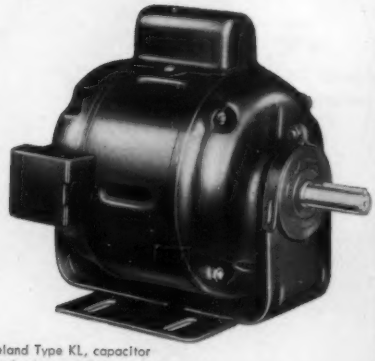
Automatic maintenance-runs are triggered every third day. The engine runs for a pre-set time, meantime recording the operation. Such frequent tests keep moving parts lubricated, replace gasoline which may have evaporated from the carburetor between test runs. Besides, plant engineers have, in the graphs, a visual record of run duration and the generator's recorded output.

Automatic testing of standbys provides the plant engineer with a check on his staff: (1) if engine fails to start during test runs, there's no record on the chart—and immediate servicing is indicated; (2) if plant engineer doesn't receive a chart every 30-days, he knows maintenance men have failed to check the unit. Either way, the plant is assured of regular standby power-plant maintenance.

SERVICE

with a smile...
from Leland

Leland Type RA, repulsion start, induction run, drip-proof, ball bearing, horizontal or vertical. Integral HP.



Leland Type KL, capacitor start, induction run, drip-proof, sleeve bearing, resilient base, ¼ through 3 HP.

Service through any one of almost 200 Leland motor service stations, in all principal cities throughout the nation.

A smile because records prove our customers seldom *need* these extensive service facilities!

From its very founding, Leland's proud policy has been to build motors that not merely meet, but *surpass* specifications . . . motors that will do the job they were intended to do, *and then some*, to give you years of trouble-free, *service-free* operation.

Yet for this very same reason—this policy of doing everything possible to assure customer satisfaction, Leland maintains an extensive, up-to-date motor service system to provide immediate, expert attention to your motor problems—whenever, *if ever*, they should arise.

Next time you need motors you can *depend* on—a few, a hundred, or thousands—look to Leland. The extensive line of Leland motors ranges from ⅛ to 5 hp., including all popular types and frames.

Another AMF Product
LELAND MOTORS

Write
THE LELAND ELECTRIC COMPANY
Division of American Machine & Foundry Company
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Visit Leland at Booth 349,
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Where can you get a sling like this?

More strength at lower cost —with JalKlamp

Now J&L can furnish safer, stronger wire rope slings and terminals *at lower cost* thanks to JalKlamp, the new sleeve for wire rope splicing, exclusive with J&L.

The reason: Non-corrosive JalKlamps are made from a special alloy. When hydraulically pressed around the rope, the alloy flows into the spaces between the wires and strands . . . produces a neat, permanent, watertight splice that's stronger than any tucked splice. And because they're machine made, JalKlamp splices cost less.

JalKlamp slings and terminals are available for all standard wire rope constructions and in diameters ranging from ⅛" through 2", with SpringKore, PlastiKore, Fiber Core, and Independent Wire Rope Centers.

Specify JalKlamp slings and terminals and get these features:

1. High Strength
2. Economy
3. Non-Corrosive
4. Water Tight
5. Permanent
6. Neat, Safe, — no jagged ends

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BULLETINS

(Begins on page 21)

161 Work Positioners — Bulletin R-1700-B15, 8-pp, outlines seven basic points in selection of positioners for welding, coating, surfacing, chipping, and other operations where handling and positioning of work is required. Advantages are explained and component parts and operation are illustrated. Information on table rotation and tilt range, maintenance and repair, range and selection of drives and safety features is given. Worthington Corp.

162 Sliding Head Drills — Catalog D-138, 10 pp, introduces a line of 16-in. sliding head bench, floor and multiple spindle drilling machines. Geared power feed, electrical controls, full floating spindle, and other design details of these drills are discussed. Photos, dimensional sketches and specifications are provided. Cincinnati Lathe and Tool Co.

163 Carbide Tools, Blanks—Eight-pp Form 355P is a price and specifications booklet covering standard carbide tools and blanks in company's Premium Grades 548 and 434. Features a selection guide for steel cutting grades which consists of a table showing proper carbide grade to use to eliminate various types of carbide failure. Adamas Carbide Corp.

164 Carbide Tooling — Catalog 55, 52-pp, describes company's line of carbide tooling, blanks and inserts for the metalworking industry. Details company's latest general purpose steel-cutting grade—K21, and introduces K11, a grade which provides exceptionally high resistance to abrasion. Photos, diagrams, and full specifications are given on each product in the line. Kennametal, Inc.

165 Magnets for Metalworking—Magnetic equipment for conveying and controlling steel and separating, retrieving and purifying ferrous materials for the metalworking industry are described in Bulletin B-207, 6 pp. Contains illustrations and specifications on newest developments in this field. Covers plate magnets, magnetic drums, sheet fanners, magnetic pulleys, ferrous cleaners, dip tank magnets and pipeline iron traps. Eriez Mfg. Co.

You'll save time in ordering Bulletins by using the Reader Service Cards provided on facing page. Of course, we honor letterhead requests—but it takes us a bit longer to handle them.

166 Drum Cleaning—Bulletin 113-D features company's blast cleaning equipment and describes its use in cleaning steel drums in reconditioning. Shows how airless abrasive blast cleaning is being used at a number of plants. Four case histories are presented, as well as photos of typical applications. American Wheelabrator & Equipment Corp.

167 Liquid Blast Cleaning—Bulletin 1403, 8 pp, on company's Hydro-Finish liquid blast cleaning equipment, contains photos, detailed drawings, dimensions, sizes and features of the EZ-2 and EZ-3 machines. The former unit has a circulating pump to handle the slurry, and the EZ-3 is fitted with air escapement units at the sides of the hopper. Pangborn Corp.

FILTRATION

168 Pipe Line Filters—Type PL pipe line filters, designed for removal of water, oil, dirt and pipe scale from compressed air or gas lines, are detailed in Form PLF-446. Contains engineering, operating and application information, and includes a table for quick computing of the correct size filter for a given installation. Air-Maze Corp.

169 Bulk Type Oil Filters—Eight-pp Bulletin 301 covers bulk type oil filters which provide depth-type filtration and are used in applications where oil must be kept absolutely clean. Describes typical filtration problems and tells how they are solved. Cutaway view shows component parts of the filter, and a table lists dimensions, specifications. Houdaille-Hershey of Indiana, Inc.

170 Portable Oil Filters—Bulletin 316 introduces company's line of portable Hyflow oil filters. Discusses oil maintenance ability and lists uses. Includes illustrations of some models and provides specific data. Combination portable oil filters—oil reclaimer units are also treated. The Hilliard Corp.

171 Diatomite Filtration—Twelve-pp Bulletin FA-51A covers filtration of potable water, process water and plant wastes with Celite diatomite filter aids. Explains how diatomite filter aids remove colloids and other suspended impurities; shows the adaptability of Celite powders to various types of filter designs; and cites some installations. Johns-Manville.

172 Diatomite Water Filters—Complete description of standard sizes of water filters, for use with porous stainless steel filter elements to handle 8 gpm to 939 gpm is contained in Release 214. Typical flow sheet is included, as well as specifications. Micro Metallic Corp.

AIR CONDITIONING, DUST AND FUME CONTROL

173 Air Conditioning Units — Twenty-pp Bulletin 8127 describes central-station, cabinet-type air conditioning units. Profusely illustrated, bulletin covers three types of air conditioning units for industrial and commercial applications. Units providing air circulation, cooling and dehumidifying, heating, air cleaning, humidification and damper control in a capacity range from 600 to 48,000 cfm are covered. Tables and graphs give data on selection of units to meet individual job requirements. Unit arrangements, specifications and characteristics shown. American Blower Corp.

174 Flexible Hose—A set of five new bulletins (Nos. 40 through 44) are of interest to plant engineers concerned with the design, installation or purchase of flexible hose for dust and fume control, air conditioning and materials handling. They provide general information, data on installation, application suggestions, technical data and prices on hose, duct and accessories. The Flexaust Co.

175 Wet Dust Control — Plant engineers faced with the problem of control of hot or moist, explosive or combustible, corrosive, abrasive or obnoxious dusts will be interested in Bulletin 919, describing type CW-1 centrifugal wet dust collector. Five photos, three line drawings and two tables give complete data on the counter-current, wet collector of tower construction. Pangborn Corp.

176 Fume Control System — Bulletin 555 describes a fume control system for toxic, as well as non-toxic fumes. Discusses operation and design features, points out advantages, and tells how the system has solved dust problem in typical plants. Martin Equipment Co.

WATER TREATING

177 On Water Clarifiers—Technical Reprint T-135 is an illustrated 8-pp paper on water clarifiers and cold process softeners. Discusses operating factors affecting dependability and economy of this equipment. Covers historical background of the solids contact units, principles of seeding in chemical reactions, separation of precipitated solids. Sections are devoted to reported operating results, ability to handle surges. Graver Water Conditioning Co.

178 Keeping Equipment Clean—Suggested policies to follow in keeping water-using equipment clean are discussed in this 6-pp folder. Mentions trouble spots that can cause failures and enforced shutdowns. Cites several examples in which special problems were solved through proper cleaning. Hall Laboratories, Inc.

PLASTICS

179 Plastic Fabrications—This 48-pp general catalog illustrates and describes company's polyethylene and polyvinyl chloride fabricated products, plates, sheets, rods, tubes, pipes, and fittings, and hot gas welding and spraying equipment. One section is devoted to charts showing chemical resistance of products made from these materials to more than 150 reagents. Book also covers self-supporting structural fabrications, details on specifying plates, sheets, rods, and operating and design features of hot gas welding and spraying equipment. Catalog is profusely illustrated with photos, engineering drawings and sketches, as well as charts and tables. American Agile Corp.

180 Thermoplastics — Seven new and improved transparent plastics are described in this illustrated 6-pp brochure. Outstanding features and physical properties are listed and applications suggested. Various plastics designed for improved performance, such as Dura-Lite which is readily machined, formed and fabricated, Homalite CR-39, Homalite 100, Homalite 141, Pox-Y-Lite, Fib-R-Lite and Saf-T-Lite are covered. The Homalite Corp.

Among Recently Published Literature of Merit . . .

181 Needle Bearings — Catalog 55, 76 pp, presents design, application and use data for five types of needle bearings. It comprises an engineering short course on bearings and is organized for proper selection of these bearings by type, size and suitability. As a convenience, facing pages show dimensional data and product applications — without cross-referring to other pages, you can see the bearing properly adapted to the load and size requirements and pertinent mounting and other installation data. Catalog is well illustrated and indexed. Bearing types covered include drawn cup assemblies, heavy duty assemblies, cam follower assemblies, needle rollers unassembled, others. The Torrington Co.

182 Steel Storage Equipment — More than two dozen ideas in space-and-time saving storage equipment are presented in 16-pp illustrated Catalog 702. Described are racks, bins, shelves, and pallet frame for more efficient, orderly storage of countless materials. Both product and in-use photos, general descriptions and specifications are provided, and more than 120 models are listed. The Frick-Gallagher Mfg. Co.

183 On Spot Welding—"Spot Welding from One Side—With a Portable Gun," 12 pp, describes an inert-gas-shielded tungsten-arc spot welding process. Over 30 tables, weld cross-section and application photos, drawings and graphs are included. Sections of text cover when to consider spot welding from one side, how the equipment operates, standards and test procedures, factors affecting weld quality. Air Reduction Sales Co., Div., Air Reduction Co., Inc.

184 Overhead Cranes—This 32-pp catalog, designed as a convenient reference manual, describes a wide variety of standard and special overhead cranes. More than 80 photos show typical crane applications, ranging from ¼-ton hand operated units to 350-ton giants, including fully-automatic types. Helpful data on planning crane installations and selection of correct types is included. Moffett Engineering Co.

185 Oven Facts—Bulletin 555, 20-pp, is a handbook designed to provide plant engineers with basic concepts of industrial heat processing and heat control. Text ranges from a discussion of heat to fuel cost comparisons and design elements—presented in readable, non-technical language. Major considerations in oven construction, heat control, design objectives are covered. Formulas for calculating heat and oven requirements included. Michigan Oven Co.

OTHER EQUIPMENT

187 Sound Reduction Doors — How this company's doors are designed for maximum sound reduction is explained in this 8-pp illustrated bulletin. Tells how they minimize transmission of noise through structure itself, and are effectively sealed at jambs, sill and astragal of double doors. Selection suggestions are given. Jamison Cold Storage Door Co.

188 Constant-Force Spring—More than 25 design applications of company's Neg'ator constant-force spring are described and illustrated in 16-pp Technical Bulletin 310N. Demonstrates

Over 2000 COCHRANE CONDENSATE RETURN SYSTEMS . . . cut costs and set new standards of production wherever steam is used for heat transfer. C-B type shown right was installed by a chemical manufacturer on a dryer for titanium dioxide. Production rose from 45 to 65 tons a day . . . a gain of 30%! Steam consumption decreased from 12,000 to 7,000 lbs/hr—reducing steam cost 40%!

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BULLETINS

(Begins on page 21)

how spring is being used in solving a variety of mechanical-loading and power-drive problems to provide improved performance with fewer components and savings in space, weight and cost. Operation of this long-extension spring and its six major forms are also pictured and discussed. Hunter Spring Co.

189 **Vibrating Screen Separators**—Catalog 112-177, 22-pp, features photos, drawings, detailed specifications of separating equipment now screening more than 241 different materials. Application data in the following industries: stone, clay, glass, food, chemicals, lumber, textile, paper, petroleum, metals, rubber, waste and pollution control are collected. A complete data file accompanies this bulletin. Southwestern Engineering Co.

190 **Lubricating Equipment**—Catalog 104, 26-pp, features industrial lubricating equipment and accessories, including lubricators, gun fillers, hand guns, power guns, portable lubricators, pumps for transfer and supply, hose reels and accessories. Construction and operation advantages are outlined and specifications listed. The Aro Equipment Corp.

191 **Colloidal Dispersions**—Forty-four colloidal and semi-colloidal dispersions for operational functions, maintenance, lubrication, and other industrial applications are listed in this revised booklet. Includes dispersions of graphite, molybdenum disulfide, mica, vermiculite, zinc oxide, and acetylene black. Carriers and diluents are given. Acheson Colloids Co.

192 **Reciprocating Boosters**—Double-acting reciprocating boosters are illustrated and described in this pamphlet. In addition to a detailed description of reciprocating booster operation, pamphlet illustrates a basic circuit, two rapid pressure build-up circuits, two slow pressure build-up circuits, and mounting and dimensional data covering these boosters in 4, 5, 6, 8, 10, 12, and 14 in. bores in 1 in. through 5½ in. diam rams. Miller Fluid Power Co.

193 **Die Castings**—This 16-pp engineering data booklet on die castings contains American Die Casting Institute standard specifications, tolerance tables and physical properties of die casting alloys. The material has been compiled to help plant engineers make more effective use of design, material and cost saving advantages of die cast component parts. Parker White Metal Co.

195 **Thermocouple Assemblies**—Features of company's thermocouple assemblies and pressure sealing glands are outlined in 20-pp Catalog 1542. Describes advantages of low mass and fast response to temperature change, tells how thermocouple glands work. Describes sealants and insulators, stainless steel protection tubes, quick-disconnect thermocouples, stainless steel packing glands, others. Conax Corp.

196 **Silicone Defoamers**—Properties and performances of silicone defoamers are detailed in this illustrated brochure. Special attention is given to Antifoam AF emulsion, an efficient and easy-to-disperse foam killer. Its parent material, Antifoam A compound, is also described. Suggested concentrations, dispersing media and application methods are discussed. Dow Corning Corp.

197 **Self-Locking Nuts**—This folder describes Flexloc self-locking nuts; shows how the locking action of the one-piece all-metal nut can be used either as locknut or stop nut. Applications of the nut are illustrated in small drawings. Standard Pressed Steel Co.

198 **Mobile Floor Cleaner**—Bulletin 551 covers outstanding features and advantages of company's Floormobile for suction cleaning (instead of sweeping) dust, dirt, lint, trash, paper from large floor areas. Case history material, comparison with other methods of cleaning, specifications given. Handling Devices Co., Inc.

199 **Long-Stroke Diaphragm**—Sixteen-pp loose-leaf Catalog BF150 describes in detail various classes of long-stroke, deep convolution, diaphragms. Included are table of standard sizes, available materials, dimensional data tables, and design data. Illustrated with photos and drawings, it will be kept current by subsequent mailings. Bellofram Corp.

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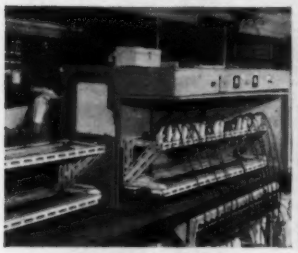
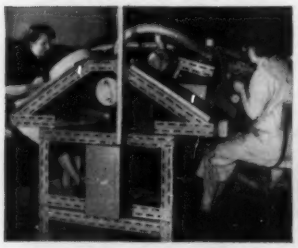
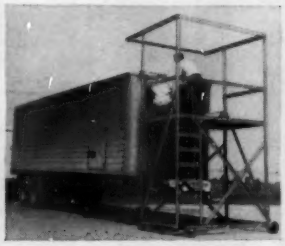


TESTING BENCH

STAIRWAY



WORK BENCH



MAINTENANCE PLATFORM

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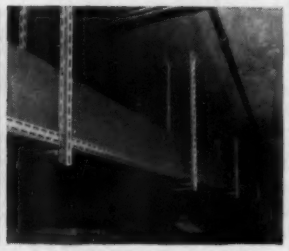
MEZZANINE FLOOR

GOODS CART



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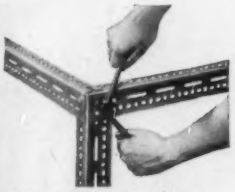

Simple to connect. All you need are two wrenches. No special parts—no training necessary.

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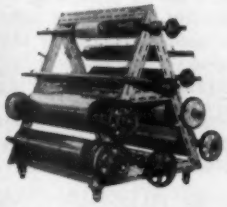

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DATA FILE of literature for the plant engineer's library

STANDARD CATALOGS, bulletins and handbooks are listed to help plant engineers maintain a permanent data file. To get these free catalogs, circle item numbers of those wanted on postage-free cards provided for you on pages 161-162.

MAINTENANCE

301 **Building Maintenance** — Handbook 7 offers 64 pp of information on floor surfacing, leak stoppers, external wall sealants, roadpatching, roofing materials. Includes instruction for applying them. Flexrock Co.

302 **Proper Care of Floors** — Filled with what-to-use and how-to-use-it information, this 32-pp booklet is a well written, practical text on floors. Presents floor preservation as a triple process involving cleaning, sealing and maintaining. Discusses various floor surfaces and their special problems. Gives helpful hints on floor maintenance and provides a handy chart covering preparation procedures and products for 12 common floor surfaces, including cement, wood. West Disinfecting Co.

303 **Better Floor Care** — This illustrated folder describes products designed to aid efficient floor care. Lists combination scrubber-vac machines, conventional scrubbing-polishing machines, steel-wool pads, applicators, vacuum cleaners, mop trucks and other mopping equipment. Included are waxes, sealers, and cleaners. Finnell System, Inc.

304 **Cleaning Problem Solutions**—Illustrated Bulletin 154, 12 pp, presents information on a wide range of cleaning methods and shows equipment available. Special emphasis is placed on the stationary vacuum cleaning system and its long-run economy in many installations. The Spencer Turbine Co.

305 **Insulation Coating** — This 32-pp illustrated handbook, Form L-17, presents the advantages of company's NoDrip insulation coating for preventing condensation drip from metal, concrete, brick, wood, plaster or composition surfaces. Lists applications and describes methods of applying. Contains tabulated data on quantity required to cover various size tanks and pipe and data on effect of different humidities. J. W. Mortell Co.

306 **Hot-Dip Galvanizing**—How hot-dip galvanizing is prolonging life of industrial equipment is stressed in this 16-pp booklet. Photos, showing galvanized equipment in use accompany brief text explaining how this process of covering iron and steel, with a protective coating of zinc serves to prevent rust. The galvanizing procedure is explained and illustrated. Coating comparison charts show how hot-dip galvanizing compares with other types of coatings as to rust resistance, dimension limits, shock resistance, initial and maintenance costs. American Hot-Dip Galvanizers Assn., Inc.

CONSTRUCTION

308 **Aluminum in Architecture**—This 32-pp booklet provides information on use of aluminum, and of special interest is a discussion on architectural colors for aluminum exterior surfaces. Also describes basic types of aluminum finishes—satin, sandblast, bright, and "as fabricated." There are drawings and details of copings and gravel stops; curtain wall products, including facings, panel assemblies and wall units; industrial roofing and siding, weatherside and underside fasteners; trim and molding; sheet, plate, foil, pipe, rod and bar stocks; and structural shapes. An alloy section lists mechanical properties of applicable alloys. Aluminum Co. of America.

309 **For Stairway Construction**—This 12-pp illustrated booklet describes the use of this company's Junior channels in stairway construction. Provides specifications and shows some of the buildings in which the channels have been used as stair stringers. Tables give size and weights, and show allowable loads. Jones & Laughlin Steel Corp.

310 **Pre-Mixed Mortar, Grout**—Bulletins are available on two recently introduced formulations—a non-shrink ready-to-use pre-mixed mortar and a pre-mixed grout, also non-shrink and ready-to-use. An 8-pp bulletin on this new grout discusses its use in grouting heavy equipment, gives procedures for mixing and placing and pictures some common methods of grouting and forming. Includes information on effect of temperature on setting time. The bulletin on pre-mixed mortar gives advantages and recommended uses. The Master Builders Co.

311 **Mobile Fire Walls**—This bulletin points out the advantage of company's Mobil fire walls. Describes three of the products designed for stopping the spread of fire within a building; fire doors, fire partitions, and non-combustible interior partitions, and presents test requirements. Virginia Metal Products Corp.

313 **How to Use Presdwood**—This 32-pp booklet is filled with design and construction data on Presdwood. Although much of the material presented deals with use of Presdwood in homes, the book offers suggestions of value in industrial construction and remodeling. Sections of this practical handbook cover product data, working, application information for both interior and exterior use, and specifications. Includes instructions on proper conditioning, use of adhesives, types of bends finishing, interior joints, fastenings. A table shows properties, sizes available and intended applications. Masonite Corp.

314 **Basic Roofing Information**—"What You Should Know About Your Roof" is a 40-pp clearly illustrated booklet which tells what makes a roof fail, how to recognize signs of roof deterioration, what to do to keep a roof in good condition. Discusses recommended roof-

It's Hot·Dip Galvanized

TWO WAY PROTECTION. This installation of Hot-Dip Galvanized chain link fence will give you double protection. It will serve the primary job of protecting your property. Secondly, and a very important factor, is that once this fence is installed there will be no necessity for costly maintenance. It's Hot-Dip Galvanized to give you the utmost protection. This galvanizing is done *after* fabrication, thus avoiding the possibility of any part of the steel being exposed.

A thick, uniform coating means complete protection for you. Sealed in zinc, this fence will not rust.

When you have a rust problem, choose Hot-Dip Galvanizing, the best rust protection you can buy. For the best in galvanizing, send your products to a member of the American Hot Dip Galvanizers Association . . . he has the know-how to give you a top quality job.

Send today for our new booklet "Stop Rust." It gives you the full story on the process, plus a comprehensive coating comparison chart. "Must It Rust" 16 mm film available for showing.

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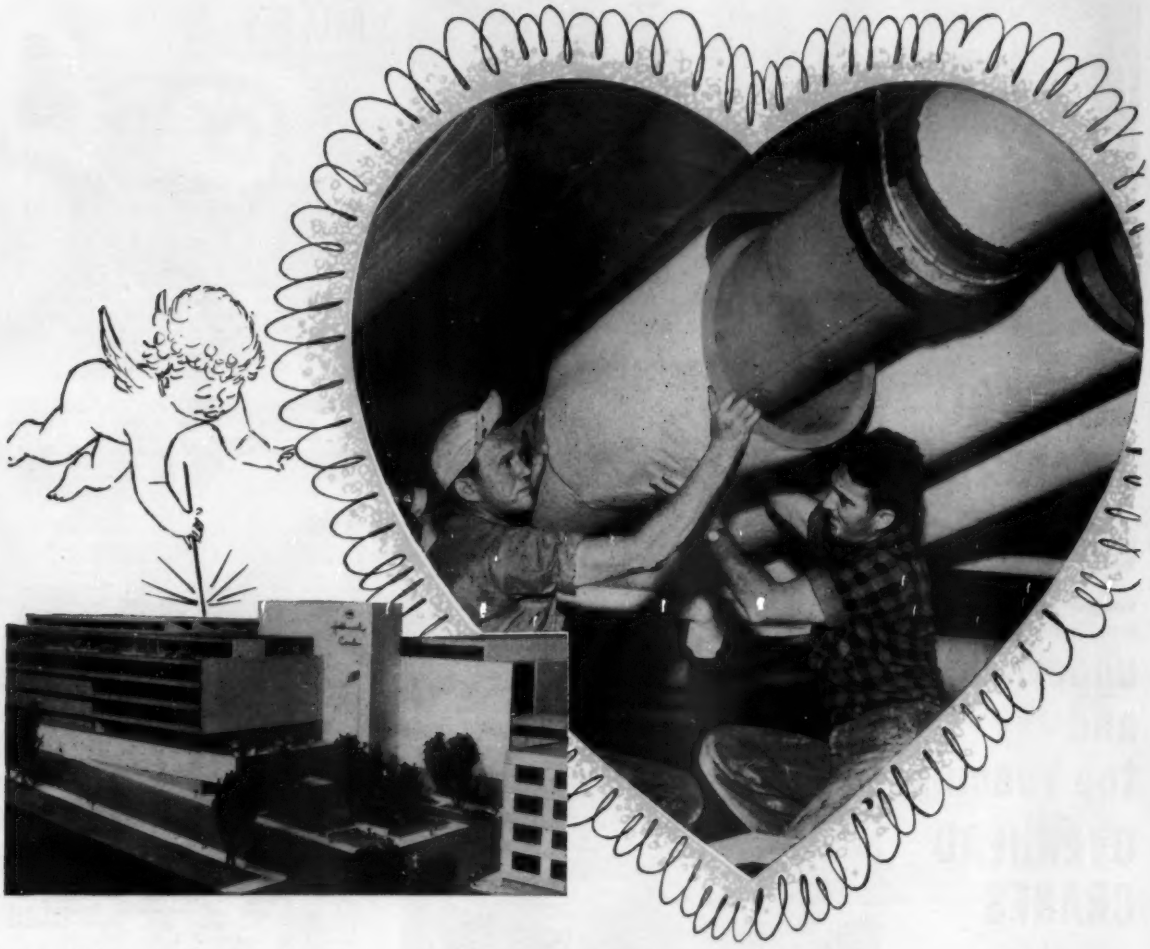

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Modern plants of every type throughout the country are selecting Snap*On for chilled lines or heated piping where temperatures do not exceed 350° F. You, too, can put on "the very best" and *save money in the bargain!* Write this very day for samples and complete technical literature.

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Representative installations of

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Designed to solve your Material Handling needs . . .

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Manufacturing both underhung and top running overhead cranes with capacities to 10 tons and spans to 60 feet, our Engineering Department works closely with your organization to select the exact crane which best meets your requirements, and to design and erect runways which will speed the flow of work.

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DATA FILE

(Begins on page 166)

ing practices, essentials of a good re-roofing job, also special features of company's roofing materials. Johns-Manville.

TOOLS, WELDING AND MACHINE SHOP EQUIPMENT

316 **Data for the Shop**—"Fluids and Facts for Metal Working" is a pocket-size booklet of about 44 pp. A section on metal working fluids covers their function and selection, preparation and use of soluble oils and paste compounds, and prevention of dermatitis. A section on metal working facts gives conversion tables, steel numbering systems, machinability ratings of metals, drill grinding charts, twist drill sizes and other data. Standard Oil Co. (Ind.)

318 **Welding Positioners** — Fully illustrated, 16-pp Bulletin P1-2 outlines important features and gives condensed specifications on four welding positioners with capacities to 35,000 lb. An efficiency graph based on typical welding jobs provides a quick picture of production advantage. Welding Div., Harnischfeger Corp.

319 **Machines for Special Products** — This 12-pp catalog lists company's machine tools and other metal fabricating, forming, treating and processing equipment which is now available for contract manufacturing. Types, quantities and operational dimensions of the facilities are included. The Jeffrey Mfg. Co.

HEATERS, HEATING

321 **Unit Heaters** — Bulletin 7517, 48 pp, presents full information on latest design of this company's Venturafin unit heaters for steam or hot water applications. Gives features of construction, general engineering data, capacity tables. Fully illustrated with photos of horizontal and vertical models, dimensional drawings and piping diagrams, booklet includes tips on the use and selection of unit heaters. American Blower Corp.

323 **Plumbing, Heating Supplies**—Edition G is the current edition of this company's 118-pp general catalog on plumbing and heating repair parts, tools and accessories. Indexed and generously illustrated; gives sizes, intended uses. J. A. Sexauer Mfg. Co., Inc.

324 **Forced Air Space Heaters**—Illustrated Bulletin 523-B, 12-pp, is devoted to a line of forced air heaters for comfort heating, year-round ventilating, tempering make-up air, process drying and heat curing. Explains design efficiency, construction details, operating principles and flexibility of application. Advantages of the heater are detailed. Dravo Corp.

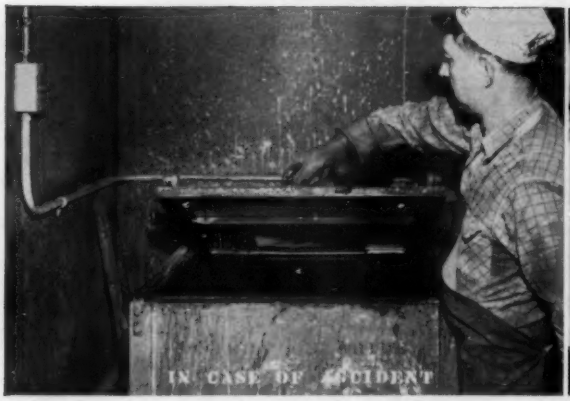
325 **Unit Heaters** — Catalog 155, 32 pp, presents unit heaters for steam and hot water in vertical and horizontal delivery and power-throw types. Cover design features and provides performance and capacity data. Also provides information on unit heater selection, sound ratings, locating unit heaters, motor wiring and control. Piping and installation suggestions are included as well as typical unit heater specifications. Modine Mfg. Co.

327 **Electric Heaters**—Bulletin E-1, 8 pp, describes electric unit heaters and heater sections for general industrial heating as well as for specialized use in heating corners of factories, warehouses. Illustrates overhead downward discharge heaters with revolving and stationary discharge outlets, and a heater with horizontal discharge. L. J. Wing Mfg. Co.

PUMPS, COMPRESSORS

328 **Sump Pump Selector** — Bulletin 54-3-1420, 20 pp, provides a selection table allowing a plant engineer to choose any of the 4000 models of the BJ Sumpmaster pumps, which range from 10 to 2600 GPM with heads from 20 to 300 ft. Includes complete dimensions and outline drawings, simple coding system for ordering. Byron Jackson Co.

329 **Data on Pumps**—This 12-pp condensed catalog covers turbine-type and centrifugal



Splashes of iron perchloride from copper etching tank are easily washed off Presdwood walls in plant of Chicago Engravers.

This Presdwood-topped etching table is still smooth and splinter free even though heavy plates are constantly being turned.

Safe, economical, maintenance-free! Presdwood top on shipping counter eliminates cuts, scrapes and slivers.

After many years as workbench tops, the same Presdwood gives added service as floor runners alongside proof press.

Presdwood solves most of our maintenance problems—says M. Dietrick, foreman, shown with G. M. Danner, production manager.

Even "dragon's blood" doesn't bother Masonite Tempered Presdwood!

Nitric acid...iron perchloride..."dragon's blood." Familiar terms in any photo-engraving plant. And unfriendly to most panel materials.

But not to Masonite® Tempered Presdwood!

"We just wipe it down and it looks like new again," says Mr. Dietrick of Chicago Engravers, discussing the Presdwood wall in the etching room. "If we hadn't put in Presdwood, we would have had a carpenter in here a couple of times to replace and refinish rotten wood."

These grainless, sliver-free panels withstand impact as well as acid. They resist the sharp edges of metal plates and engraving tools. They offer an ideal surface for work tables and floor runners, too.

Your building materials dealer has Tempered Presdwood® panels. Send the coupon for cost-saving ideas you can use in your plant.

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Stearns Magnetic, Inc. puts the power of magnetism to work on many industrial problems. In material handling, for example, Stearns builds lifting magnets for handling scrap iron, castings etc., magnetic pipe rolls for guiding pipe, grinder-holding magnets for holding castings during grinding or machining, drill-stand magnets for holding drill tools in position securely. In power transmission control, Stearns builds magnetic brakes for stopping motors instantly, magnetic clutches for controlling machines ranging in size from small computers to giant steel mill screw-downs. Stearns also builds magnetic separators, such as magnetic pulleys and suspended magnets to remove tramp iron from material in process; high-intensity, multiple-stage, cross-belt separators to remove tiny iron particles from non-magnetic materials like sand or plastic powder.

In addition, Stearns builds many other types of magnetic equipment. We will be happy to send literature on any of the magnetic units mentioned above — or answer specific questions on the use of magnetic equipment in material handling, power transmission, or product purification. Write, wire or call us or see your Stearns representative.

MAGNETIC EQUIPMENT FOR ALL INDUSTRY

STEARNS **MAGNETS**

STEARNS MAGNETIC, INC., 669 S. 28th St., Milwaukee 46, Wis.

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DATA FILE

(Begins on page 166)

pumps for a wide range of industrial uses. Gives construction specifications, capacities, application information as well as reference to specific literature on each type. Fully illustrated. Also includes data on mixed flow pumps, sump pumps. Aurora Pump Co.

330 **Condensed Pump Data**—Form 4383-J covers more than 20 types of general service pumps, rotary pumps, sump and drainage pumps, condensate units, self-priming units, stainless steel pumps and high-pressure pumps. In easy-to-find tabular form, each model is pictured along with its characteristics, applications, and features. Goulds Pumps, Inc.

331 **Continuous Flow Pump**—Bulletin 30-C, 8-pp, outlines advantages of company's Moyno pumps which handle a variety of materials—from free-flowing liquids to non-pourable pastes, abrasives, solids. Describes principle of operation, discusses performance, construction, capacities, and includes photos, diagrams and specifications. Robbins & Myers, Inc.

332 **Gas-Engine Driven Compressors**—A new two-cycle turbocharged compressor is described in 24-pp Bulletin 134. Stresses economy of installation and operation afforded by this gas-engine driven unit, lists other advantages. Explains how turbocharging saves on fuel and cooling. Design and construction features of this new model are discussed and illustrated in detail. Clark Bros. Co.

333 **Compressors**—Bulletin A72, 36 pp, gives construction, operation information on company's Class WN-114 heavy-duty air compressors. Illustrates seven models of compressor as a single unit for displacement capacities from 1186 to 1948 cfm, twin units furnishing up to 3896 cfm. Joy Mfg. Co.

334 **Portable Compressors**—Twelve-pp Catalog GG-9A pictures 40 models of company's portable type compressors. A quick reference chart shows capacities, engine types, and mountings available. Illustrates such features as: replaceable cylinder sleeves, interchangeable valve parts, aircraft type compressor cylinders, heavy duty industrial type engines, and magneto ignition on all gasoline models. Le Roi Div., Westinghouse Air Brake Co.

WATER CONDITIONING

335 **Testing Equipment**—Designed for use as a guide in the selection of water testing equipment, this 12-pp bulletin describes complete line of titration stands and tests for hardness, alkalinity, chloride, sulfide, etc.: cabinets and test set for similar tests; Conducto Bridge for determination of specific conductance of water solutions, colorimetric comparators; and the photometer. W. H. & L. D. Betz.

337 **Feedwater Treating**—Bulletin 1855, 30 pp, features manufacturer's hot process Accelerator for treatment of boiler feedwater, illustrating and explaining its operation and advantages, optional equipment. Contains excellent discussion of necessity for treatment of makeup water, selection of proper equipment. Also covers the limitations of hot process softening. Infilco Inc.

338 **Handbook on Demineralizing**—Comprehensive 40-pp Bulletin 5800-B compares various methods of water treatment, indicating the comparison between demineralizers and evaporators. It discusses the characteristics of the various types of available cation and anion exchange materials and offers data on operating costs of demineralizing. It tells when to use 2-bed, 3-bed, 4-bed, mixed or mono-bed demineralizers. It also indicates when decarbonators or vacuum deaerators are required. The bulletin is replete with typical flow diagrams, photos of installations. Cochrane Corp.

MECHANICAL POWER TRANSMISSION

340 **Flexible Couplings** — Condensed Engineering Catalog 51-A contains excellent data on the choice and use of company's flexible metal couplings. Tells advantages of these couplings and discusses design principles.

DATA FILE

(Begins on page 166)

Double-flexing and floating shaft types, light duty couplings and types for special applications are described and pictured in detail. Thomas Flexible Coupling Co.

341 Fluid Couplings—Bulletin 144-D, 14-pp, presents complete installation and performance data on fluid couplings. Illustrated with diagrams and drawings, bulletin shows ease of applying company's fluid couplings on any type industrial equipment, powered by any type electric motor or internal combustion engine from ¾ to 850 hp. Describes standard models providing standard input, output combinations, and standard models in packaged units. Installation hook-ups are given, along with typical applications. Twin Disc Clutch Co.

342 Roller Chains, Sprockets—Catalog 754, 64 pp, describes, illustrates a line of roller chain stock sprockets, including minimum Lore sprockets for reboring, also finished bore and Taper-lock bushed sprockets which are ready to use. Tables show speed ratios for sprocket combinations, standard keyways and setscrews. Includes chain selection and application data, installation and lubrication recommendations, chain length calculations, dimensions and price lists for single and multiple strand roller chains. Diamond Chain Co.

344 Shaft Mounted Drives—Plant Engineers who use machines requiring input speeds between 420 and 10 rpm in the range between ½ and 30 hp, will be interested in 8-pp Bulletin 7101. Contains complete information — design data, selection tables, dimensions, weights, installation photos—on this modern type of standard gear drive designed for high ratios of speed reduction in limited space, with savings in initial and installation costs. The Falk Corp.

ELECTRICAL

345 Variable Speed Motors—Sixteen-pp Bulletin 1797, revised, outlines many reasons why variable speed motors can be used to improve production, and it includes illustrations of all types of company's Varidrive motors, as well as their mechanical features, remote controls; etc. U. S. Electrical Motors, Inc.

346 Motor Buying Guide — Bulletin GEC-1026, 28-pp, features company's standard a-c fractional and integral horsepower motors in most general use. Included are general—and definite—purpose, fractional horsepower motors, and fhp gear motors. A section on selection of integral horsepower motors covers horsepower requirements, enclosures, starting current limitations, speeds, motor types, and selection of fuses and circuit breakers. Descriptions and specifications cover single-phase, polyphase, totally enclosed fan cooled, and gear-type integral horsepower motors. Photos, ratings, dimensions, weights, frame numbers, and modifications included. General Electric Co.

348 Motor Lubrication Tips—"To Grease or Not to Grease" is an illustrated bulletin on lubrication of ball bearing motors. Gives general information on lubricants and lubricating agents. Discusses importance of lubrication to bearing life. Also covers choice of lubricant and procedure. Wagner Electric Corp.

349 Commutator Slip Ring Maintenance—This practical little 40-pp handbook gives procedures and methods for commutator and slip ring maintenance. Generously illustrated with photos and sketches, booklet contains sections devoted to common troubles and their corrections; brushes; general maintenance; and company's products for maintenance of commutators and slip rings. Defines commutator terminology. Ideal Industries, Inc.

351 Batteries for Control Switchgear—This company's PlastiCal (lead calcium) and PlastiCell (high-tensile alloy grid) batteries for control, switchgear, and auxiliary power are described as to design, application and performance in Bulletins CP-536 and CP-537. Specifications given. C & D Batteries, Inc.

352 Handbook on Storage Batteries—This 64-pp booklet of instructions and technical data is the sixth edition of this company's battery service manual. Provides a brief treatise on the theory of the lead-acid battery. Gives detailed instruction on the care and operation of batteries, on maintenance and repairs, and on standard and special parts. Booklet is of special value to plant engineers concerned with storage batteries for cycle service in industrial trucks and materials handling equipment. Gould-National Batteries, Inc.

353 Toggle Switch—Catalog 73a, 12 pp, covers 19 precision snap-action toggle assemblies and more than 90 AN and JAN approved designs, including assemblies that will control from 1 to 24 separate electrical circuits. Contains dimensions, operating characteristics, electrical ratings, contact arrangements on each switch, and an illustration of one representative switch from each group of switches. Gives general information on each "family" of switches which are designed for low voltage d-c applications. Micro Switch Div., Minneapolis-Honeywell Regulator Co.

354 Small Motor Switches—This 14-pp booklet describes a line of toggle, rotary and push-button switches—popular types designed to meet requirements of manufacturing, plant maintenance. Generously illustrated, this booklet also includes complete rating tables. Cutler-Hammer, Inc.

355 Cable for Lighting—Sixteen-pp Publication 19-294, of interest to plant engineers concerned with road lighting, offers help in selecting the type of cable best suited to a particular installation. Both series and multiple street lighting are discussed. Specification data is given on cables for direct burial, and for use in conduit, duct or open-air as well as for cables for overhead lines. Splicing and terminating methods for insulations given. Construction Materials Div., General Electric Co.

356 Power and Control Cables—Sixty-pp Catalog 24 describes typical power and control cable designs and is intended as a guide in selecting proper wire and cable type. Describes insulations, sheaths and coverings, electrostatic shielding, and includes product data on all types listed. Rome Cable Corp.

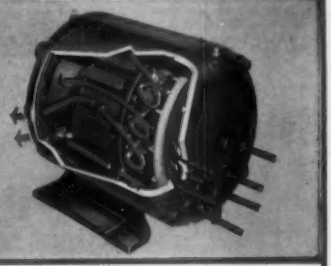
357 Electrical Conduit—This 8-pp bulletin, Form 646, describes company's heavy-duty,

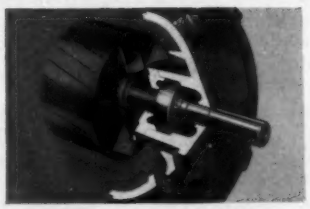
To PLANT ENGINEERS, Howell suggests

What to look for in Part-Winding Motors

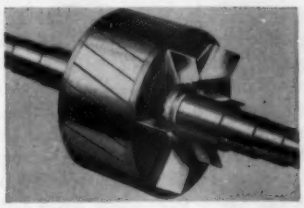
If you've investigated reduced voltage starting of centrifugal pumps, compressors, etc. with part winding (synchronous) motors, you know of the economies and efficiency to be gained.* But, as in other types of motors, manufacturers' constructions differ considerably. Below are some points for comparison . . . and a few of many reasons why Howell motors are so outstanding!

VENTILATION . . . "Cool running" means long life in motors. The steel shell of a Howell motor and a new stator design with the largest air passages yet devised put ample ventilation where it's needed. Compare!





BEARINGS . . . They should be fully protected. Dirt can't enter Howell's double shielded bearings either from inside or outside the motor, because they are sealed in the end plate cavities by dust-tight inner caps. Compare!



COPPER-CLAD ROTORS . . . Howell motors have copper-wound rotors. This means better heat conductivity, stability at high temperatures and, as opposed to die-cast rotors, greater design flexibility to meet your special requirements. Compare!

Part winding motors reduce starting shock to machines, minimize line disturbances, and offer the advantages of low cost 2- or 3-step starters. A Howell motor specialist will be glad to show you their advantages (and limitations).

WRITE FOR BULLETIN BW-1

HOWELL MOTORS

HOWELL ELECTRIC MOTORS COMPANY, HOWELL, MICH.
Precision-Built Motors for Industry Since 1915

HOWELL Red Band MOTORS

For more facts circle 618 on Reply Card

Part of 18 barbed-wire machines at Mid-States Steel & Wire Co., all equipped with Twin Disc 8.4 HYDRO-SHEAVE Drives mounted on 3 hp 1750 rpm motors. Twin Disc Fluid Drives are available in 10 different models, for any input, output combination, with sizes from 7.45 to 27 for ¾ to 850 hp. Request Bulletin 144-D.

Stops breaks and spares the horses

With mechanical drive on 18 barbed-wire machines, Mid-States Steel & Wire Co. of Crawfordsville, Ind., had frequent wire breakage demanding constant operator attention. And with an extremely high starting load, a 5 horsepower motor was required for each machine.

To cure the problem, Mid-States called in their Authorized Twin Disc Hydraulic Dealer. The installation was analyzed, and Twin Disc Model 8.4 HYDRO-SHEAVE® Drives were recommended. Through these compact, self-contained fluid drives, Mid-States eliminated mechanical drive.

Immediate benefits were realized through reduction of motor size to 3 hp, selected for *running* requirements rather than starting requirements. Excessive wire breakage was stopped, for the fluid drives permit quick, smooth, motor acceleration while they pick up the load . . . without shock-loads or vibrations.

You, too, can "stop breaks and spare the horses" on powered equipment . . . by contacting your Twin Disc Authorized Hydraulic Dealer. *Write today to Twin Disc Clutch Company, Dept. DS, Racine, Wis., for full information.*

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

TWIN DISC
Fluid Couplings

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

Branches or Sales Engineering Offices: Cleveland • Dallas • Detroit • Los Angeles • Newark • New Orleans • Seattle • Tulsa

For more facts circle 619 on Reply Card

DATA FILE

(Begins on page 166)

rigid steel electrical conduit, reproducing test data sheets to show how the protected conduit stands up under corrosive attacks of salt spray, sulfuric acid, caustic soda, and exposure to excessive heat. Four-color photos illustrate the effects on this and other conduit after exposure to attacks listed above. National Electric Products Corp.

358 **The Answers on Wiring**—"20 Questions and 20 Answers on Safety m.i. Wiring" describes and illustrates characteristics and advantages of this new wiring system. A complete table of types, sizes, weights and lengths are included. General Cable Corp.

LIGHTING

359 **Fixture Suspension System** — Catalog FF-4, 6 pp, describes a system of fluorescent fixture suspension. Information on parts, suspension and assembly procedure and installation is explained in detail. Also shown are various channels and wire sizes, UL approved for using the system as a surface metal raceway—to suspend and power fluorescent fixture installations. Line drawings and installation photos show how this system requires fewer hanger stems and canopies, and affords other advantages. Unistrut Products Co.

360 **Selection Data on Lighting Fixture Hangers**—Catalog 50, 80 pp, contains general and detailed information on disconnecting and lowering lighting fixture hangers, accessories, special devices and parts. Utilizes 247 photos and drawings to show construction principles, operating features, installations, modifications and component parts for both indoor and outdoor units. The Thompson Electric Co.

362 **Fluorescent Lighting**—This 24-pp fluorescent lighting guide book is a reference digest on fluorescent products. Gives advantages of this type of lighting; summarizes various lamps and parts, including starter sockets, lampholders. Includes reference chart for lamp performance when interchanged with typical ballasts. Tabulations include seven shades of "white" lamps. Ordering details included. Sylvania Electric Products Inc.

MATERIALS HANDLING

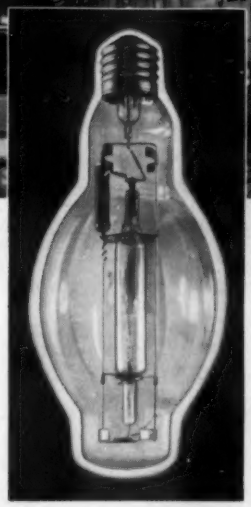
365 **Overhead Handling Equipment**—Booklet 2008-K, 12 pp, is the current edition of this company's engineering and application data booklet covering overhead materials handling equipment. Describes and illustrates track drives, cranes, electrification, buckets, grabs. Cleveland Tramrail Div., The Cleveland Crane & Engineering Co.

366 **Manual on Electric Hoists** — Catalog H-46, 40 pp, covers monorail and stationary hoists and car pulleys. Explains fundamental types of grabs, methods of hanging I-beams, types of hoist suspension, controls. American Engineering Co.

367 **Overhead Cranes**—Bulletin T202, 20 pp, gives full information on top running double girder cranes with top running trolley in capacities from 2 to 12 tons, spans to 60 ft. Data is also given on top running single girder cranes, both motor driven bridge types and head geared or push type in capacities from 1 to 10 tons, spans to 50 ft. Features which contribute to efficient operation and low maintenance costs are detailed. Several pages are devoted to electrical information. Chicago Tramrail Corp.

369 **Electric Hoist Manual**—Catalog 215-B offers 38 pp of engineering, application and ordering information on company's Load Lifter electric hoists. Presents hoists with hand operated trolleys and with power travel, hoists with lug suspension, hook suspension and push-type trolleys, and with hand-geared trolleys, hoists. Manning, Maxwell & Moore, Inc.

370 **Transit Crane**—Twelve-pp Bulletin 15-B-TC-1 describes a transit crane of 15-ton capacity. Illustrated by job application photos and closeups of mechanical features, the booklet includes a list of specifications and working ranges, plus brief, easy-to-read description of the machines, advantages. Bucyrus-Erie Co.



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✓ The high efficiency of Sylvania Mercury Vapor Lighting

✓ Improved COLOR as well

If you have been hesitating about installing high-efficiency Sylvania Mercury Vapor lighting because of its inherent color—you need wait no longer!

Sylvania phosphor-coated mercury vapor lamps, used in standard mercury vapor circuits, will give greatly improved color rendition that is adequate for most applications. If still better color is needed, combine Sylvania mercury vapor lamps with Sylvania fluorescent lamps in lower-mounted fixtures—up to 40 or 50 feet. For high mounting heights, combine Sylvania mercury vapor with Sylvania incandescent lamps.

When you combine mercury vapor with fluorescent or incandescent lighting, you gain another important advantage, too . . . greater protection in the event of momentary power interruption.

So . . . there is no longer any need to hesitate because of *color*. Get the real economies that only mercury vapor lighting can give you—*plus* improved color through Sylvania phosphor-coated lamps or regular high-output Sylvania mercury vapor lamps in combination with Sylvania fluorescent or incandescent.

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P.S. In the Summertime with the steam off, the revolving discharge outlets produce a pleasant cooling effect . . .

The fact that the discharge outlets of the Wing Revolving Heater keep the heated air in constant gentle motion, with no steady sickening blasts of hot air on the workers, is one reason why so many firms are adopting Wing Revolving Heaters as "morale boosters". Employees in these plants work in pleasant, comfortably warmed surroundings, and being comfortable they are more productive.

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DATA FILE

(Begins on page 166)

371 **Cranes for Big Jobs**—A new 1½-yard shovel, 35-ton crane is described in this 6-pp catalog. Action pictures of the machine in quarries and gravel plants are included, also specifications. American Hoist & Derrick Co.

372 **Hydraulic Lifters** — Standard Products Bulletin 54, 12 pp, features new Worklifters portable, battery-operated, hydraulic lifters available in a variety of special purpose designs, in a 1000 lb capacity, and with lifts up to 80 in. Also describes company's Shoplifters with both hand powered and electric hoisting units. Economy Engineering Co.

373 **Electric Hoists**—Twelve-pp Bulletin DH 133B describes Speedway electric hoists of 500- to 4000-lb capacities. Fully illustrates and explains design features and gives details on suspensions and conductor systems. Clearance data, specifications included. Wright Hoist Div., American Chain & Cable Co., Inc.

375 **Conveyor and Elevator Belting Tips**—This 32-pp manual on installation, maintenance and care of conveyor and elevator belting, uses photos and drawings to show ways to improve belt service and lengthen belt life. Includes a discussion of belt design, covers, reinforcements and grades. Repair methods, splicing, and fastenings are also covered, and there's a table listing common conveyor belt maintenance problems with their cause and remedies. The B. F. Goodrich Co.

376 **Conveyor Trolleys** — A new line of ball bearing trolleys for overhead conveyors is covered in 20-pp Book 2536. Contains specification data for the selection of new trolleys, or of replacement trolleys for existing installations. Describes many features resulting in low operating and maintenance cost. Link-Belt Co.

377 **Metal Conveyor Belts** — This 24-pp booklet is an illustrated guide to selection of metal conveyor belts. Presents both conventional and balanced spiral weave belts; covers raised edge and flight constructions, chain edge construction, high temperature belts, wire conveyor aprons. Wickwire Spencer Steel Div., The Colorado Fuel & Iron Corp.

379 **Engineered Conveyor Systems**—Catalog 853, 32 pp, illustrates conveyor systems in use in a wide range of industries, showing how they suit handling requirements involved. Roller, wheel, belt, chain, overhead trolley and elevating conveyors are included, also spirals, portable power conveyors, ball transfers and special equipment. Mathews Conveyor Co.

380 **For Hopper Economy**—"In Dollars and Sense" explains long run economy of company's self-dumping hoppers showing how they operate and telling how they fit particular plant requirements. Illustrated with photos, gives dimensions, weight of a standard 1-yd model. Roura Iron Works.

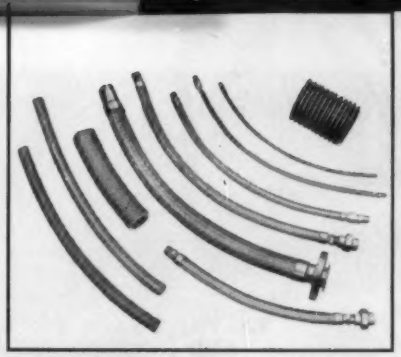
381 **How to Pick a Truck** — Catalog 54, 8 pp, features a step-by-step procedure for making the best fork truck choice for a particular handing job. Other sections in the booklet show at a glance complete specifications on each of company's trucks, and illustrates important construction and design features. The Baker-Raulang Co.

INSULATION

382 **Pipe Insulation**—Bulletin F 1-100 features on-the-job installation photographs of cellular glass insulation for pipe temperatures between—300 and 800 F. Complete listing of physical properties, condensed specifications are given. Pittsburgh Corning Corp.

383 **Insulating Material** — Ultrafine, a new thermal and acoustical insulation made of blown glass fibers, is the subject of this bulletin. Complete with photos of insulation in use and tables showing its efficiency, bulletin gives properties, principal uses, handling characteristics, thermal conductivity, and acoustical efficiency. Gustin-Bacon Mfg. Co.

384 **One-Coat Insulation**—This 32-pp booklet describes company's Type D insulation, a

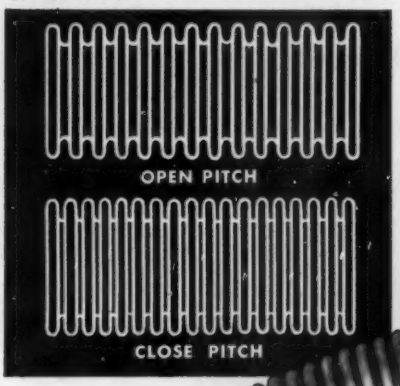


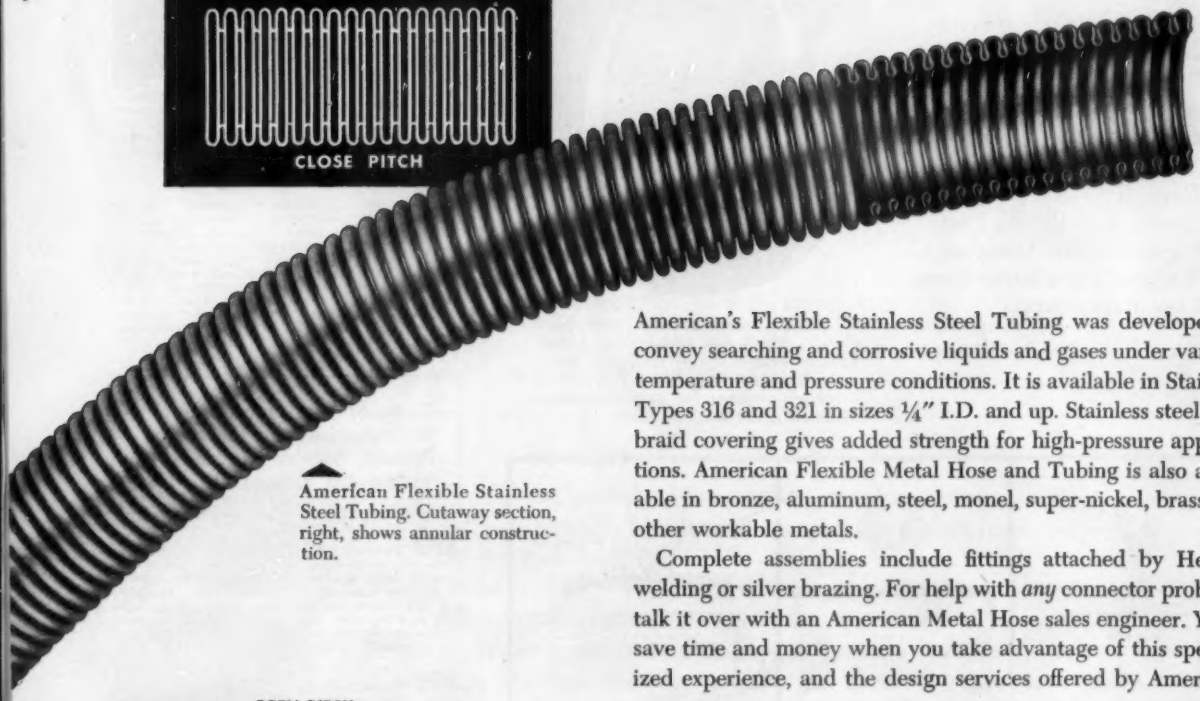
Typical American Stainless Steel Tubing and assemblies designed and manufactured for specific service conditions.

To convey high-temperature, high-pressure CORROSIVE gases and liquids... AMERICAN'S

FLEXIBLE STAINLESS STEEL TUBING

stands up under continuous flexing
absorbs severe vibration
compensates for misalignment
is easily installed





American Flexible Stainless Steel Tubing. Cutaway section, right, shows annular construction.

American's Flexible Stainless Steel Tubing was developed to convey searching and corrosive liquids and gases under varying temperature and pressure conditions. It is available in Stainless Types 316 and 321 in sizes ¼" I.D. and up. Stainless steel wire braid covering gives added strength for high-pressure applications. American Flexible Metal Hose and Tubing is also available in bronze, aluminum, steel, monel, super-nickel, brass and other workable metals.

Complete assemblies include fittings attached by Heliarc welding or silver brazing. For help with *any* connector problem, talk it over with an American Metal Hose sales engineer. You'll save time and money when you take advantage of this specialized experience, and the design services offered by American.

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OPEN PITCH for general service

CLOSE PITCH for extra flexibility, frequent movement, excessive vibration

STAINLESS STEEL BRAID gives added strength for high-pressure service

ASSEMBLIES made up to your specifications complete with fittings attached

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AMERICAN FLEXIBLE METAL HOSE AND TUBING

AN ANACONDA® PRODUCT

FREE FOLDER!

Four-page folder gives engineering data on construction and types. Includes pressure ranges, bending diameters, weights, data on fittings.

Write *today* for your copy. *Please print.*

PLE

The American Brass Company, American Metal Hose Branch, Waterbury 20, Connecticut.

Please send me a copy of Bulletin STC-1, "Flexible Stainless Steel Tubing by American."

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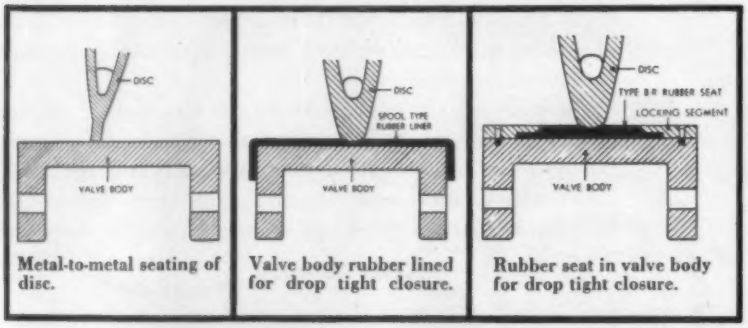
For Flow Control

Butterfly Valves

Offer These Advantages

1—Minimum Restriction to Flow
2—Minimum Turbulence
3—Non Clogging—Self-Cleaning
4—Always Easy to Open and Close
5—Manual or Automatic Control
6—Lower Installation Cost
7—Light Weight—Compact
8—Reduced Installation Space
9—Less Maintenance

42"—125# butterfly valve with hard chrome edged disc, stainless steel shaft, bronze bearings and enclosed worm gear, handwheel operator. Valve body lined with rubber for drop tight shut-off at 140 p.s.i. water pressure.



Metal-to-metal seating of disc. | **Valve body rubber lined for drop tight closure.** | **Rubber seat in valve body for drop tight closure.**

In W. S. Rockwell Butterfly Valves you have the most completely engineered line for power and industrial pipe line and equipment control of air, gases, liquids and semi-solids. Standard valves are built in sizes to 72" for low pressures as well as 25-, 50- and 125-lb. service, in any required combination of metals, with manual or automatic operators. Larger sizes and higher pressures can be built to specifications.... Write for catalog.

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DATA FILE

(Begins on page 166)

sprayed-on coating for surfaces with temperature range from—40 to 300 F. Tells how one application of this coating not only insulates but also waterproofs, rustproofs, deadens sound, prevents condensation and resists fire. Insul-Mastic Corp. of America.

VALVES, TRAPS, PIPING AND ACCESSORIES

386 Choosing the Right Valve—Presenting valve selection as a matter of matching the valve's service characteristics with the service requirements of the job, this practical 20-pp booklet explains and illustrates basic design features of gate, globe and check valves. It tells in non-technical language, how each of these valve types works, and where it is best suited for use. Disc, stem connection, bonnet and bonnet-joint characteristics are also discussed and stem-operation is treated. Crane Co.

388 For Quick Valve Selection—Here's a 20-pp catalog digest providing ordering and application information on gate, globe, angle and check valves in bronze, iron, cast and forged steel construction, also valve accessories and parts. Illustrated, includes pressure-temperature chart. The Ohio Injector Co.

390 Valve Maintenance Guide — "Prevent Valve Failure Before It Starts," is a 28-pp text on valve selection, installation, inspection. Pictures damaged valves, explains how damage could have been prevented, discusses maintenance schedules, inspection jobs, lubrication, pipe line checking, threading, regrinding, disc replacement. Jenkins Bros.

391 Industrial Valves—Condensed Catalog 105, 28-pp, contains data on valves for a wide variety of applications. Includes dimensions and illustrations describing non-return (stop-check) valves, globe and angle stop valves, pressure seal design, angle univalves and small size globe valves designed for chain or extension operation in vertical lines. Also included is company's Mudwonder valve for abrasive fluid application in industry as well as mudlines in the oil field. Edward Valves, Inc.

To order these catalogs circle item numbers on the handy Reader Service Cards provided on pages 161-162.

393 Hydraulic Control Valves—Eight new hydraulic control valves with ball detent for position locking are described in 26-pp Section 4 of this company's Catalog 200. Included are six three-position, four-way valves, and two two-position, four- and three-way valves. Dimensional data and typical circuit diagrams are provided. Logansport Machine Co., Inc.

395 Butterfly-Valves — Construction details, engineering and application data on butterfly valves are provided in three illustrated bulletins. Eight-pp Bulletin 557 covers those of standard heavy-duty construction; Bulletin 558, 8 pp, those of standard medium-duty construction; and Bulletin 559, rubber-lined butterfly valves. W. S. Rockwell Co.

396 Valve Installation Tips—Comprehensive instructions on proper way to install company's Line Blind valves are given in this pocket-size 24-pp manual. Concisely written, the booklet is illustrated with cartoon-type drawings. A separate section is devoted to trouble shooting for faulty-installation techniques along with recommended corrective procedures. While dealing primarily with Line Blind valves, this information can be applied also to gate, globe and plug valves. Hamer Oil Tool Co.

397 Steam, Air and Gasoline Traps—Catalog 751, 32 pp, is a recently issued trap ordering book with capacity tables, installation diagrams, and containing charts and formulas for determining proper size trap for specific applications. Covers thermostatic steam traps, expansion steam traps, weight-operated traps for

A hydraulic system works better... lasts longer ...costs you less

with FILTERED FLUID

A little dirt goes a long way in a hydraulic system. At the least, it seriously lowers the system's efficiency. At the worst, impurities can put the system completely out of action with a bad case of sticky valves, leaky seals and jammed pistons. Even a closed system can contaminate its own fluid with microscopic bits of metal worn from moving parts.

So, as you can see, proper filtration of hydraulic fluid is vital.

In fact it's indispensable to: —

A Machine tool production schedules and standards of work quality.

B Efficient, profitable operation of machines like fork-lift trucks and earth-moving equipment.

C Precise, effective control of automatic manufacturing processes.

D Safe, reliable operation of critical aircraft control mechanisms.

E Longest possible service life of *all* hydraulically-operated equipment.

You'll find an economical answer to your specific hydraulic fluid filtration problem among the wide selection of standard Purolator units.

Write for Purolator's General Industrial Catalog, or send us details of your particular application. We'll be glad to advise you . . . there's no obligation on your part, naturally. Address Dept. P2-84, Purolator Products, Inc., Rahway, N. J.

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PUROLATOR PRODUCTS, INC., Rahway, New Jersey

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Unload 2 tons with 1 hand

It's easy with a Roura Self-Dumping Hopper. Simple, one-man operation does it with amazing speed . . . *cuts cost of hand unloading by at least 50%*. That's why hundreds of leading industries have found it the safe, sensible, economical way to handle wet or dry, hot or cold bulky materials.

It fits securely on any standard fork or platform lift truck . . . turns it into an efficient, semi-automatic dump truck. And, remember . . . Roura makes 'em rugged . . . extra heavy gauge welded construction . . . to withstand years of toughest treatment. They're available in sizes from ½ to 2 cubic yards.

Let Roura help *you* cut costs.

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HOPPER

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1405 Woodland Ave., Detroit 11, Michigan

For more facts circle 625 on Reply Card

DATA FILE

(Begins on page 166)

steam, air, gasoline, pressures up to 1500 lb. separators. W. H. Nicholson & Co.

398 **Steam Trap Book**—Catalog J, 44 pp, includes physical data and prices on cast semi-steel and forged steel inverted bucket steam traps, compound steam traps and ball float air and air relief traps; a handbook section explaining how to calculate condensate loads and select traps for all equipment; a maintenance section. Armstrong Machine Works.

399 **Steam Trap Reference Manual** — Bulletin T-1740, 24 pp, tells why and where steam traps should be used; explains desirable trap features. Advantages of company's impulse steam traps are described, their operation illustrated. How to figure trap size and how to size condensate return lines are told and capacity and pipe dimension charts and thermodynamic properties of saturated steam included. Yarnall-Waring Co.

400 **Handbook on Fittings, Flanges**—Catalog wf-1950, 68 pp, offers working information on seamless carbon steel welding fittings and forged steel flanges. Includes dimensional tolerances, thread standards and threading practice; service pressure, ratings, physical and chemical requirements. Grinnell Co., Inc.

401 **Jacketed Piping, Cocks**—Twelve-pp Bulletin 152 discusses the special advantages, problems and requirements of jacketed piping installations and shows how manufacturer's jacketed piping, cocks, fittings and relief valves are designed to fulfill requirements. Illustrated with photos and drawings, includes specifications. Parks-Cramer Co.

402 **Wrought Iron Pipe** — Technical information required in specifying pipe and tubing is graphically presented in this 52-pp catalog. Tables list size and dimensional data of wrought iron pipe and tubular products, and show dimensions. Data is also provided on wire and sheet metal gages, flow of water in gpm and conversion factors. Tables include size and dimensional data for various types of pipe. Supplementary tables give information on wrought iron physical characteristics and special properties. A. M. Byers Co.

LUBRICANTS, LUBRICATION

403 **Spray Lube System**—This 8-pp illustrated bulletin describes company's method of single and multi-point application of liquids to a wide range of metal cutting and forming operations. Tells how it works and records results of various tests, as well as listing advantages. C. A. Norgren Co.

404 **Proper Lubrication**—Presenting proper lubrication as the life blood of all machinery, 36-pp Lubriplate Data Book 54-1 is a helpful treatise on modern lubrication practice. Gives product data on both oil type lubricants and greases and discusses choice of lubricants for use in applications involving heavy loads, high speeds, extreme temperatures, water conditions and other conditions. Provides tables of specific recommendations for various classes of equipment used in chemical processing, metal-working, other industries. Lubriplate Div., Fiske Brothers Refining Co.

INSTRUMENTS, CONTROLS

405 **Control Centers**—Advantages of control centers and their versatility are discussed in this 28-pp booklet. Illustrated with photos and full-colored drawing, booklet shows 10 typical installations of control centers and explains how this equipment can lower costs. Design and construction features are explained, and three basic NEMA types of construction described. Electrical and mechanical construction details are shown, typical specifications provided. The Clark Controller Co.

407 **Orifice Meters**—Bulletin 1050 Rev. I, 28 pp, shows how manufacturer's orifice meters are made, how they operate. Tables give capacity data, and there are descriptions of manifold arrangements and differential ranges, along with illustration of various parts. Sketches show how meters are used. Rockwell Mfg. Co.

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. . . when you want thermostatic control for showers, heating and air conditioning systems or industrial processes.

Accurate, automatic control of temperature, humidity or pressure pays big dividends. An experienced Powers engineer will gladly help you select the right type for your requirements.

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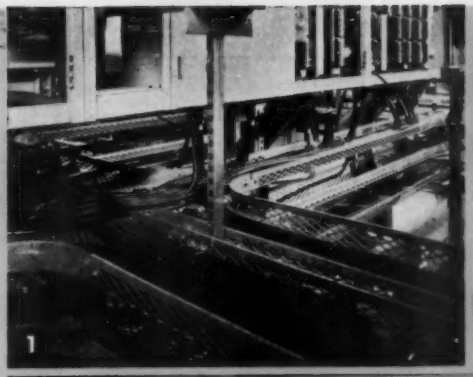
❶ RoMarine-RoPrene's light weight and smaller diameters make it ideal for trays, racks and other metal raceway installations.

❷ RoMarine-RoPrene is easy to pull in manholes and conduit or duct runs.

❸ RoMarine-RoPrene is all-resistant to the effects of burial directly in earth.



You can cut cable costs with this premium cable

Yes, it is true that in the long run it often costs less to buy the best. RoMarine-RoPrene power distribution cable proves it. It has an enviable performance record. In construction, it combines high quality RoMarine, heat- and moisture-resistant rubber insulation, with the ruggedness of RoPrene (Neoprene) sheath. Economy results not only from its dependability but from its versatility, as well. RoMarine-RoPrene is one cable that can be installed aerially, in ducts and conduits, buried directly in earth or in runs combining all three. Widely accepted for power-distribution circuits, there are many instances where it becomes a money-saving building wire. It costs but little more than the cheapest . . . yet more than makes up the difference with long life and electrical stability.

How you save

Compared with cables having metallic coverings, RoMarine-RoPrene makes these economies possible:

- Lower original purchase cost
- Savings through reduced inventory
- Lower replacement costs
- Less termination and splicing expense with fewer accessories.

You get these advantages:

- Exceptionally long service life
- Ease of terminating and splicing
- Light weight and smaller diameters
- No fibrous or other coverings to deteriorate
- Immunity to the effects of electrolysis, corrosion and temperature extremes
- High resistance to oils, acids, alkalies, moisture, abrasion, flame and weather.

Where you can use RoMarine-RoPrene®

Generally recommended for 600-volt service, RoMarine-RoPrene is ideal for a multiplicity of applications by electrical utilities, in industrial plants, for rural electrification, airport wiring and residential services.

It is specifically approved by Underwriters' Laboratories, Inc. as Type USE for underground service entrances.

It is approved by Civil Aeronautics Administration for airport wiring, when CAA Specification L-824, with Type A insulation, applies.

It has been proved a superior product for general purpose wiring and, except under circumstances of the National Electrical Code, can be unhesitatingly recommended for 75°C. operation.

It will pay you to check into the economy and serviceability of RoMarine-RoPrene power distribution cables. Detailed specifications and prices are yours for the asking. Write or phone today for Bulletin RR-2.

It Costs Less to Buy the Best

ROME CABLE Corporation
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and
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How Good COMMUTATOR MAINTENANCE Saves Money

IT'S JUST LIKE CHANGING THE OIL IN YOUR CAR...

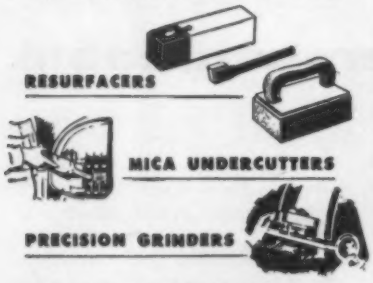
You do this regularly because it makes your car run better and last longer. The trifling expense protects you against loss.

It's the same with motors and generators. Periodic maintenance of commutators and slip rings is simply low-cost insurance against high-cost replacement, rebuilding and motor failure.

Keep Your Motors Running Longer at Lower Cost with

IDEAL PREVENTIVE MAINTENANCE

THE COMPLETE IDEAL LINE:



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FLEXIBLE ABRASIVE STICKS

Ideal Preventive Maintenance gives you everything you need to set up a preventive maintenance program that will save you many times its small cost. NO DISMANTLING OR TAKING EQUIPMENT OUT OF SERVICE WHEN IT'S NEEDED.

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For more facts circle 628 on Reply Card

DATA FILE

(Begins on page 166)

408 **Thermal Controls** — Descriptive information and basic technical data on company's Thermoswitch controls are presented in 52-pp Catalog 400. Generously illustrated, this booklet explains basic principle of the controls and why they are sensitive only to heat. Selection and application suggestions are provided, also ordering instructions. Products listed include cartridge, hex-head, block head, flange head, all-purpose, junction box, high temperature and other types of the controls. Fenwal Inc.

VENTILATING AND DUST CONTROL

410 **Dust Control, Blast Cleaning**—Bulletin 1210, 24 pp, fully illustrated, describes manufacturer's line of blast cleaning and dust control equipment, accessories. It is indexed according to equipment, type and purpose. Lists three methods of abrasive application. Pangborn Corp.

412 **Ventilating Equipment**—A 36-pp guide to selection of propeller fan type ventilating equipment, Catalog 151 includes specifications and installation data on company's propeller fans in portable, tubeaxial, centrifugal, roof ventilator and other types. Detailed illustrations of construction features accent design and performance factors. Case study photos show installations. Ilg Electric Ventilating Co.

413 **Ventilating, Heating Equipment** — Revised Bulletin PB-290, 36 pp, describes and illustrates a line of heating, air conditioning, ventilating and heat transfer equipment. All new products, as well as existing ones with improvements are covered by text and illustration—although full information is not given on each product. Bulletin shows new large size CenTraVacs, cold generators, duplex compressors, Climate Changers, Delt-Flo fin coils and other equipment. The Trane Co.

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Works in seconds!

Loosens Rusted Bolts
nuts . . . screws . . . parts

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A powerful blend of quick-acting solvents that frees "frozen" parts without breakage. Safe for all metals and alloys.

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Makes all assemblies leakproof and pressure-tight. Easy to apply with brush-in-handle.

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RADIATOR SPECIALTY COMPANY
Charlotte, N. C.

For more facts circle 629 on Reply Card

NEW! 'Sexauer' Monel Self-Locking bibb screw—10 sizes do the work of 37!

NEW! 'Sexauer' Easy-Tite faucet washer with Fiberglas reinforcing

This nylon plug locks the screw *automatically!*

NEW! Amazing, patented screw and washer combination cuts faucet washer replacements 75%

—with each leak eliminated, you reduce water and fuel bills up to $28.80 quarterly

Most faucet washer failures are caused by wrong length screws. 'Sexauer' Self-Locking screws* and Easy-Tite washers*—used together—cut costly washer replacements 75%! You save up to $28.80 quarterly in water and fuel alone with each leak stopped. Here's how . . .

A screw *too short* for the tapping distorts and splits the washer when tightened; the washer works loose, is torn to shreds. If *too long*, it can't grip the washer; this ruins the washer and causes hammering in the water line.

Simplifies fitting problem—cuts installation costs

NYLON PLUG

'Sexauer' Self-Locking screws eliminate the problem of misfit screws. They lock *automatically* at the required depth as the nylon plug is compressed in the faucet thread. The washer is not distorted, is held firmly.

You can re-use Self-Locking bibb screws repeatedly. Made of Monel, they resist corrosion, never rust; heads won't twist off, screw driver will not distort the slot.

Self-Locking screws save time spent in fitting the proper length—10 sizes do the work of 37! Used with new, Fiberglas-reinforced 'Sexauer' Easy-Tites, they cut washer replacements 75%, fixtures last longer. Easy-Tites resist closing squeeze and excessively hot water, outlast ordinary washers 6 to 1!

Water and fuel savings

One dripping faucet wastes 8,000 gals. of water yearly. A pinhole size stream increases waste to 8,000 gals. in a *single month!* Here is what you save *quarterly* in stopping just *one* pinhole leak on a hot water faucet:

Fuel Saving		Water Saving	Total Saving
Oil (198 gals.)	$22.77	$6.03	$28.80
Coal (2,469 lbs.)	22.22	6.03	28.25
Gas (21,103 cu. ft.)	21.20	6.03	27.23

Save water, fuel and labor costs; conserve costly fixtures by cutting washer replacements 75%! Use *new* 'Sexauer' Self-Locking screws and Easy-Tite faucet washers. *You save every time you do!*

WRITE FOR CATALOG. New 'Sexauer' Self-Locking screws and Easy-Tite washers are just part of the line of over 3,000 'Sexauer' Triple-Wear plumbing repair parts and patented precision tools. Send for our new, 126-page Catalog H. *Write today!*

*Reg. U. S. Pat. Off.

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WORLD'S LEADING SPECIALISTS IN PLUMBING AND HEATING REPAIR PARTS

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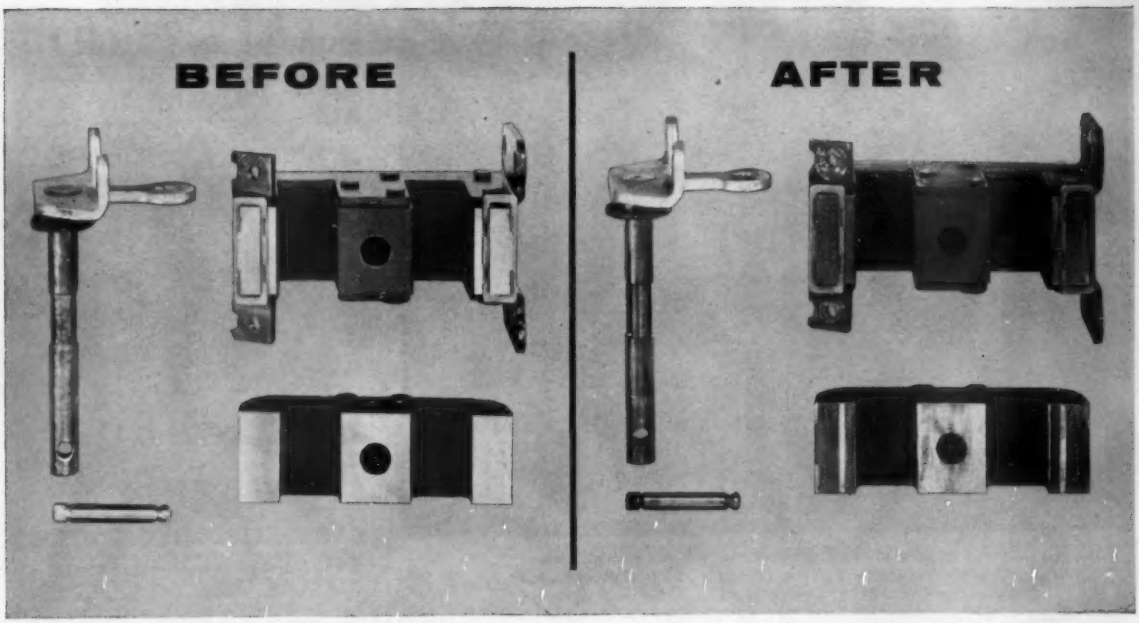


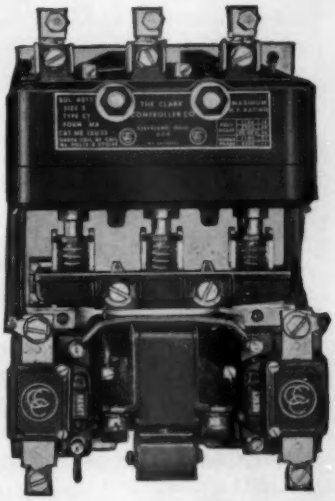
PROOF OF LONG LIFE OF CLARK TYPE "CY" STARTERS

These unretouched photos show magnet parts of a CLARK Bulletin 7707 Contactor—the contactor used on standard CLARK Bulletin 6013, Size 2, Type "CY" AC motor starters—as they looked before and after nearly 3 years of continuous service. During this time the contactor opened and closed 4 to 5 times per minute, 24 hours per day, 7 days per week—a total well over 5 million operations.

The contactor was in service at Taylor Instrument Companies, Rochester, N. Y., on a "Hevi-duty" molten salt pot electric furnace used for instrument calibration. It was installed *after several contactors of another make had failed in 4 months or less.* Our contactor was still performing perfectly when it was replaced by another identical unit, so that we could study the magnet wear.

All wearing surfaces were carefully "miked" and each dimension compared with the original. As seen in the "before and after" photos, wear was barely apparent to the naked eye. Micrometer readings showed actual wear measurable only in thousandths and ten thousandths of an inch. Only a fraction of the usable life had been consumed.

Write for descriptive literature.



CLARK Type "CY" Starters *include many more features for dependable service and reduced maintenance. Let us tell you the complete story.*

The **CLARK** **CONTROLLER** *Company*

Engineered Electrical Control

1146 East 152nd Street • • Cleveland 10, Ohio

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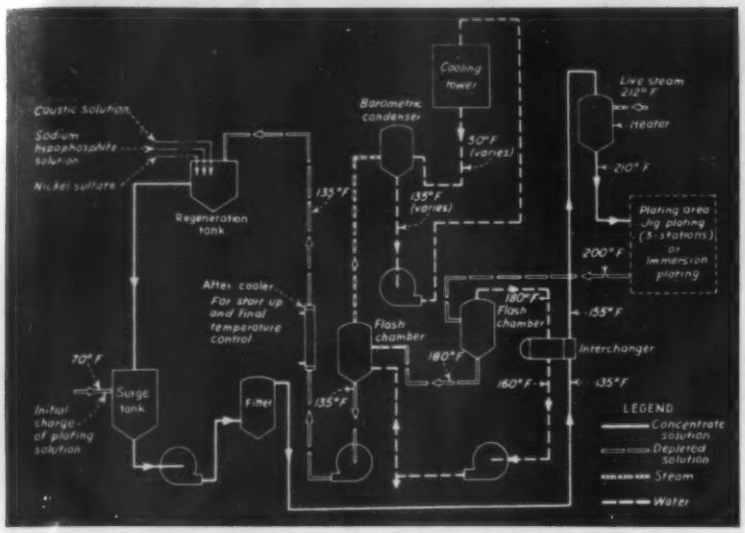
For more facts circle 631 on Reply Card



Here's the flow chart of a process that couldn't operate without the use of PYREX *brand pipe to guarantee free-flowing, unclogged fluids handling. It's the Alcoplate chemical nickel-plating process.*

This process could not work . . . without the unique properties of glass pipe

This chemical nickel-plating process, used by Alco Products, Inc., depends on the use of glass pipe.

Nickel would settle out on metal pipe and soon stop the flow. Glass pipe stays open, and the process is successful.

In this case, PYREX brand pipe was selected because of a *unique* advantage over all other kinds of pipe. But the majority of users choose PYREX brand pipe because of its *relative* superiorities.

For example, PYREX pipe is superior in resistance to corrosion. It is corrosion resistant to more acids and acidic solutions than any other corrosion resistant piping.

Smooth and hard, it resists buildup of sediments, gives no grip for solid matter.

And PYREX brand pipe gives you visibility—you can check your process by visual inspection.

Why not check both the unique properties and the inherent superiorities of *glass* pipe against the special needs of your own processes?

To learn more about the unique pipe that's served industry for over 30 years, send for literature.

Corning means research in Glass

CORNING GLASS WORKS, 31-8 Crystal Street, Corning, N. Y.

Please send material on PYREX brand glass pipe.

Name ..... Title .....

Company .....

Address .....

City ..... Zone ..... State .....

For more facts circle 632 on Reply Card

DATA FILE

(Begins on page 166)

415 **Dust Control** — "Engineered Efficiency in Dust Collection and Recovery," 36 pp, discusses industrial dust recovery from standpoint of nuisance abatement, waste avoidance, hazard elimination. Shows effect of variation in particle size, distribution and specific gravity of dust on efficiency of the dust collecting system. Buell Engineering Co., Inc.

416 **Tubing for Many Jobs** — Flexible tubing for ventilation, fume and dust removal as well as materials handling is described in 8-pp Catalog C2-4. Gives detailed information on company's Spiratube A and Spiratube R, two types of lightweight tubing made from continuous helical coils of spring wire wound with overlapping plies of fabric. Gives applications. Flexible Tubing Corp.

417 **Air Conditioning Filters**—Bulletin 600, 8 pp, describes company's Staynew ventilation and air conditioning filters. Specifications, engineering, performance and installation data covering dry type panel filters, for the removal of air-borne impurities given. Dollinger Corp.

OVENS, FINISHING SYSTEMS

418 **Industrial Ovens** — Engineering, manufacturing and installation of processing ovens are described in Bulletin D-53-20, 16 pp. Covers oven types, application to industry source of heat, selection of heater, control of heat, distribution of heat. Photos show typical oven installations, and a complete modern finishing process is presented. Newcomb-Detroit Co.

419 **Industrial Ovens** — Thirteen types of company's Conventioneered ovens, which apply principles of forced convection heating to various industrial processes, are illustrated and described in 12-pp Bulletin 200. These ovens serve foundries, metal finishers, plastics producers. The W. W. Sly Mfg. Co.

Here's how we

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DATA FILE

(Begins on page 166)

420 **Finishing Systems**—Illustrated Catalog A-653, 12 pp, describes complete finishing systems for porcelain and synthetic enamel, lacquer, paint, and other finishing. Also covers a variety of other industrial equipment including ovens, dust collectors. The R. C. Mahon Co.

OTHER EQUIPMENT

421 **To Keep Wire Rope at Work**—Form 3547 is an 82-pp handbook titled: "Here's How to Keep Your Wire Rope Working," and is filled with practical tips on care and use of wire rope. Tells how wire rope is constructed, what types are suited to various jobs, how to install it. Covers such subjects as abrasion, lubrication, avoiding kinks, alignment of sheaves, winding on drums, bending fatigue, wire breaks, when to discard a wire rope. Wire Rope Div., American Chain & Cable Co., Inc.

423 **Filter Fabric Facts**—This 16-pp illustrated booklet contains information about filtration principles; filtering devices; filter media; textile fibers for filtration; a comprehensive chart on chemical and heat resistance of cotton and synthetic fabrics; sections on yarns, fabrics construction and finishing; and a round-up of filter fabrics in use. Photos illustrate variety of filter fabrics being produced for industrial use. Wellington Sears Co.

424 **Filters, Strainers**—Industrial Catalog 1054, 48 pp, provides application and engineering information on company's line of micronic filters and precision strainers. Fuel filters, full-flow and by-pass lube filters, air separators, and metal edge strainers for fuel lube and industrial use are presented along with construction details, performance data, and specifications. Purolator Products, Inc.

426 **Improved Hose Coupling**—A quick connect-disconnect hose coupling for water, oil, steam, gas and chemical lines is described in this 16-pp bulletin. Describes the coupling's construction and explains how it provides a sealing action which makes the coupling tighter as internal pressure increases, and a full swiveling action that prevents hose twisting and kinking. Titeflex, Inc.

428 **Production Control System, Procedures**—Publication X-1268, 56 pp, details a method of material control intended to result in a shorter planning cycle while speeding production by eliminating causes of delay on the production lines. Illustrated with typical forms and charts, book outlines procedures for engineering, production planning and progress, machine load, material and tool procurement and control. Remington Rand Inc.

429 **Felt, Felt Products**—This 24-pp technical design book describes hundreds of uses of felt, with emphasis on mechanical applications. Explains and illustrates how felts are used for their friction qualities, for cushioning, for filtering, for insulating, for sealing, for spacing, and as wicking. Gives design properties of felt and discusses 10 reasons for its importance to industry. Also tells how to select the proper felt for the job. The Felters Co.

430 **Hose and Tubing**—Catalog CC-400 is a 16-pp illustrated quick-reference booklet on manufacturer's flexible metal hose and tubing. These products are made in two basic types: seamless and strip wound. Catalog shows wide range of available alloys and sizes, suggests uses; gives data. The American Brass Co.

431 **Precision in Packaging**—The advantages of automatic machine packaging are outlined in this illustrated 24-pp bulletin. Describes various packaging and sealing machines, indicates kinds of packaging machinery now being produced. Illustrates various folding carton styles. Robert Gair Co., Inc.

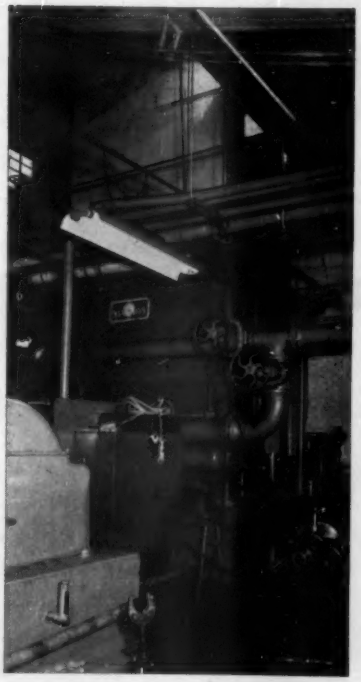
432 **Packaged Boilers**—This 16-pp illustrated catalog describes manufacturer's new Type VP Package boiler. Following a section of background information is an outline of principal design features of these boilers, which are shop assembled and provide steam capacities from 4000 to 30,000 lb per hour. Space requirements are shown in a table along with specifications. Combustion Engineering, Inc.

You Get Trustworthy Liquid or Gas Cooling With Great Cooling Water Savings from the NIAGARA AERO HEAT EXCHANGER

● You can cool air, gas, water, oils, chemicals, electric and power and process equipment, engines, mechanical processes with lower cost and really accurate control of temperature with the Niagara Aero Heat Exchanger.

You are assured of uniform, constant production and quality from any process . . . steady, reliable operation . . . lower cost for more dependable cooling. You can have closed system cooling with freedom from scale, dirt, corrosion and maintenance troubles. You can accurately cool more than one type of liquid with one machine.

The Niagara Aero Heat Exchanger uses atmospheric air to cool liquids and gases by evaporative cooling. You can remove heat at the rate of input to keep accurate control of gas or liquid temperature. You can put heat back into the system to save the losses of a "warm-up" period or to equalize the effect of load variations.



Great savings in cooling water and savings in piping, pumping and power return the cost to you quickly. The Niagara Aero Heat Exchanger can save you approximately 95% of your cooling water cost. Write for Bulletin 120.

NIAGARA BLOWER COMPANY

Over 35 Years Service in Industrial Air Engineering

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How can BROOK build better electric motors that sell for Less?

Here's How:

Brook has warehouses and distribution all over the world. Brook builds a. c. motors exclusively. As one of the oldest and largest motor manufacturers, Brook's production "know how" and volume result in motors built for a maximum service life at a lower cost.

WORLD'S MOST RESPECTED MOTOR

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1 H.P. to 350 H.P.

FAST DELIVERY OF ALL POPULAR MODELS:

Brook Motors are available from warehouses at Chicago; Miami, Fla.; Jersey City, N. J.; Houston; Los Angeles; San Francisco; Seattle; Salt Lake City; Savannah, Georgia; and other major distributing points.

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SPEED UP LIQUID HANDLING

for—
Chemical Processing
Vehicle Fueling
Fire Fighting
Cleaning
Production
and wherever hose is used!

Hundreds of standard types and sizes. Also, custom built to your specifications

Save time!
Speed production!
Improve safety!
Save hose!
Stop waste!
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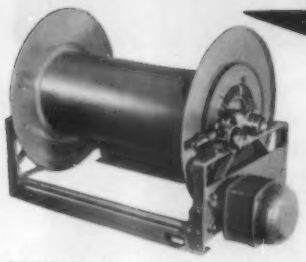

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For more facts circle 636 on Reply Card

Safety Comes First

(Continued from page 105)

Before Mr. Lowe had his combustible gas indicator, an explosion sent the top of a huge heat exchanger tank flying off its moorings. Three Camp employees were injured. There have been no recurrences.

Over the main entrance of the plant is the legend: Safety First. Quality Second. Production Third." Management and personnel have made this more than a slogan; it is a way of life at Camp Manufacturing Company.

Workers in all areas of the plant are reported by Mr. Lowe to be appreciative of safety developments and cooperative in the execution of all new safety projects. "They know," he says, "the advantages of helping to keep the safety equipment in a first-class condition at all times so that it is ready when needed."

Meanwhile, Camp management is continuing its program of safety education and rewarding employees achieving new safety records.

Camera Short Cuts

(Continued from page 89)

angles before dismantling is started and enlarged prints should be placed on the wall near the unit. It will then not be necessary to depend upon the memory of the mechanics and pipefitters when the equipment is reassembled to assure that the proper piping, lubrication, cooling water connections, etc., are made and that the guards, enclosures, counters, temperature recorders, etc., are replaced in their original positions.

No special photographic equipment is required for taking these pictures of process piping or equipment. If your company does not have a photographer on its staff, there are many commercial photographers who will take these pictures for a very reasonable fee. In

PROFESSIONAL SERVICE

J. E. SIRRINE COMPANY
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Design and Supervision of Steam and Hydro-electric Power Plants, Industrial Plants, Mechanical and Operating Surveys, Appraisals • Plans • Reports.
GREENVILLE, S. C.

CLASSIFIED ADVERTISING

HELP WANTED

WANTED: Master mechanic for large N. C. textile company. Age 30-45, high school graduate with the equivalent of 2 years trade school training. Must know electricity and boiler plants and have had experience supervising machine shop and maintenance crews. Write Box 2032, Plant Engineering, 110 S. Dearborn St., Chicago 3, Ill.

INTEGRITY COUNTS in PUMPS, Too

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Aurora Horizontally Split Case, Double Suction, Single Stage Centrifugal Pump
For general water supply for municipalities, industries, office buildings, institutions—also—for handling liquids, chemical solutions, oils etc., in a wide variety of industries. Write for Bulletin 105-BM for further details.
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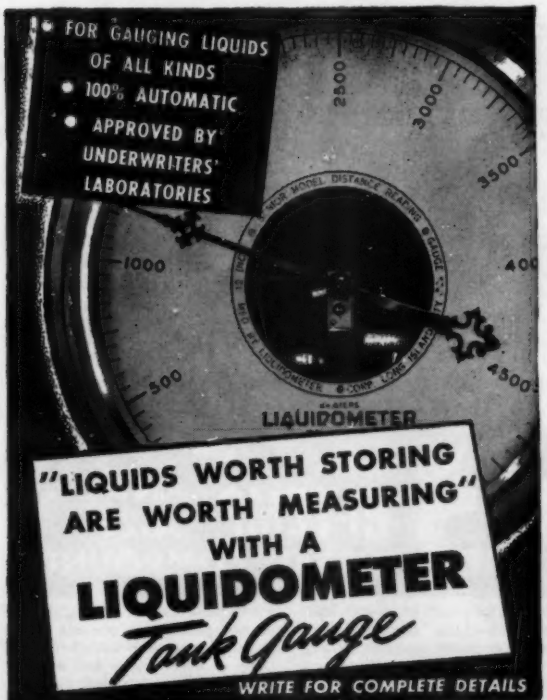

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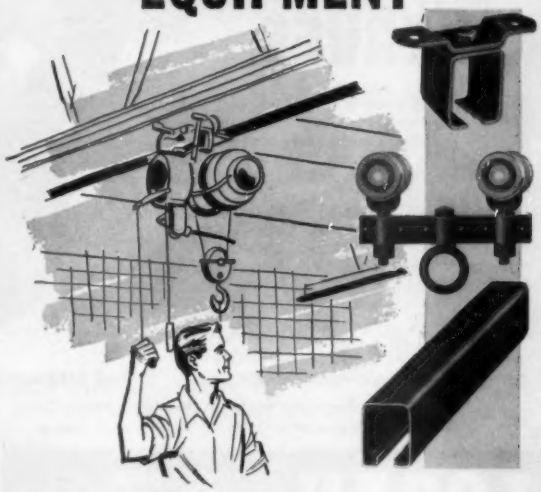

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general, a camera with an *f* 3.5 lens is adequate. It is advantageous to use a camera having a short focal length lens since it permits a wide field of view with maximum sharpness in both foreground and background, even when the picture requires considerable depth. High speed press type films are unnecessary and in the case of very small negatives, undesirable. Ansco Supreme Rollfilm, Ansco Isopan Sheet Film or equivalent is recommended, as negatives made from these films give extremely sharp enlargements, even from as small as 2¼ in. square negatives. Flash illumination rather than flood lighting is recommended to eliminate the wiring problem and to save time. Flood lighting is slightly cheaper if the time spent photographing a job is not a major factor.

The pictures taken were made with a 2¼ in. by 2¼ in. Ansco Reflex camera with Ansco Supreme roll film, size 120. The camera was mounted on a tripod. Most of the pictures were taken using only one flash bulb. Where there was a large amount of piping and shadows were deep, two spaced bulbs were used.

The use of photographs in place of mechanical drawings is not new but is often overlooked as a means to save money by eliminating drawings.

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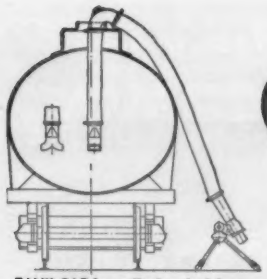

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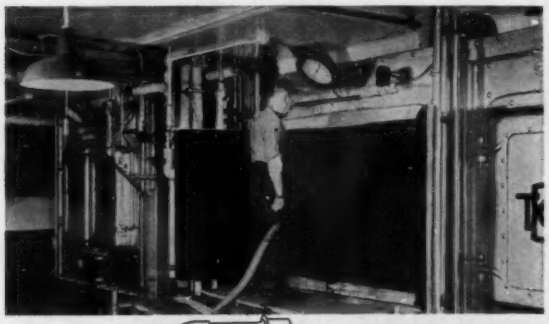

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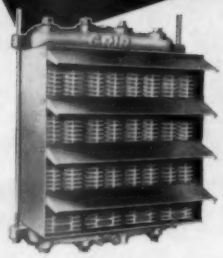

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GRID'S ability to withstand steam pressures up to 250# P.S.I.

GRID'S low outlet temperatures, proper fan sizes and motor speeds assure delivery of warm comfortable air in ample volume, directly to the spot where it is needed.

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NEW BOOKS

for the plant engineer

D-C Machines

CONNECTING AND TESTING Direct-current Machines by F. A. Annett and A. C. Roe. Size 9¼ by 6¼ in.; illustrated; third edition; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. Price $5.00.

FOR A BETTER CONTROL of situations involving d-c machines, this manual should come in handy. It tells how to do things. For example, the book offers information on the method of changing a machine from series to shunt operation, or shunt to series.

The volume is actually divided into two sections. The first is given to the reconnecting of d-c machines. This includes illustrated material on various types of windings and explains the same. Attention is also given to reconnecting for changes in voltage, speed or a combination of both requirements. In addition to this, the book offers a way of figuring new winding for an old machine and tells how to increase ratings.

The second main section of the book pertains to testing and trouble shooting. Among the subjects given attention are the following: location of faults in armatures, short circuits in armature windings, location of grounds in armatures and faults in field coils.

In the final chapter space is devoted to high frequency testing. Some of the topics that are covered are as follows: surge tester, armature-winding insulation tester, contact fixture and oscilloscope waves.

Maintenance and Engineering

TECHNIQUES OF PLANT MAINTENANCE and Engineering-1955. Size 11¼ by 8⅝ in.; 218 pp; cloth bound. Published by Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y. Price $7.50.

AT THE LAST PLANT maintenance and engineering conference held in Chicago much useful matter was offered to people in attendance in the form of papers, discussions and question and answer sessions. A great deal of this information is presented in this report of the proceedings. It includes twenty-three papers that were given and which cover various phases of plant maintenance and engineering.

Some of the topics brought to attention by the papers are the following: the wants of both maintenance and management people in their relation with each other, maintenance force organization, cost control, preventive maintenance, planning and scheduling, and communication between management and maintenance.

Boilers, Turbines and Engines

APPLIED THERMODYNAMICS—Norris, Therkelsen and Trent. Size 9¼ by 6¼ in.; 490 pp including index; illustrated; cloth bound. Published by McGraw-Hill Book Company, Inc., 330 West 42nd Street, New York 36, N. Y. Price $7.50.

THE THIRD EDITION of the book incorporates information on engineering developments that came into light since the previous edition was first published over ten years ago.

In the introductory chapter, consideration is given to the increasing use of power and the importance of heat power. The book then goes into an extensive discussion on internal-combustion engines covering different types; the gas turbine is also covered. Aspects of internal-combustion engine operation are given attention. These pertain to carburetion, ignition, lubrication, governing and supercharging.

In later sections of the book, inter-

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In order to eliminate a dust nuisance and also collect usable product, the company modernized its dust collecting system with Banister DUSTMASTERS. Before replacing the old system, extensive tests were made to determine which equipment would do the job best at a moderate cost.

DUSTMASTERS were selected on the basis of the findings. They have greatly improved product recovery, eliminated a public nuisance, and solved long standing maintenance problems.

Our engineering and manufacturing facilities are at your service. Your inquiries will receive prompt attention. Send for Catalog and material showing how DUSTMASTER Systems solved many so-called impossible dust collecting problems.

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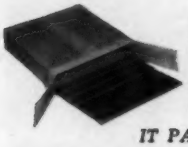

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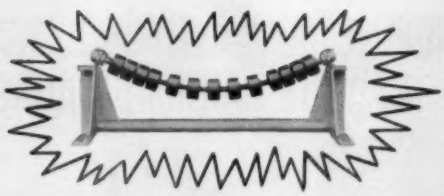

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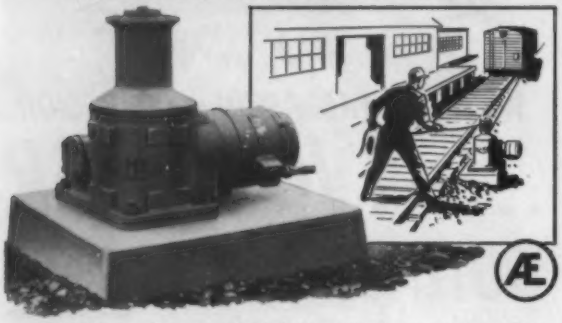

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TECHNICAL COATINGS SINCE 1895

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nal-combustion engine cycles and actual engine performance information is presented. The reader will find in the performance section text material on such items as thermal efficiency, rating, heat losses and balance.

Thermodynamic characteristics of steam are treated in a separate chapter. This is good background and review information for engineers concerned with the operation of boilers, engines and steam turbines. Other sections cover such subjects as steam engine performance, various types of steam turbines, condensing equipment, boiler fuels, boiler performance, compressors and refrigeration.

Some of the items found in the appendix portion of the book are as follows: Mollier diagram, Freon F-12 tables, air tables, and a chart on air-borne solids.

Industrial Research

COORDINATION, CONTROL and Financing of Industrial Research, by Albert H. Rubenstein, Editor. Size 9 by 6 in.; 430 pp; cloth bound. Published by the King's Crown Press, Columbia University, New York. Price $8.50.

THIS BOOK is the fourth in a series, reporting the proceedings of the Annual Conference on Industrial Research, sponsored by the Department of Industrial Engineering at Columbia University.

No proceedings were published for the fourth conference in 1953, consequently, selective papers from this conference are included in this volume.

Some of the chapter headings in this book are: the current status of industrial research, coordination of research with sales, new product innovation and introduction—their broad implications, internal control of research operations, top management, research project evaluation, automatic data reduction, and operation of an industrial computing facility.

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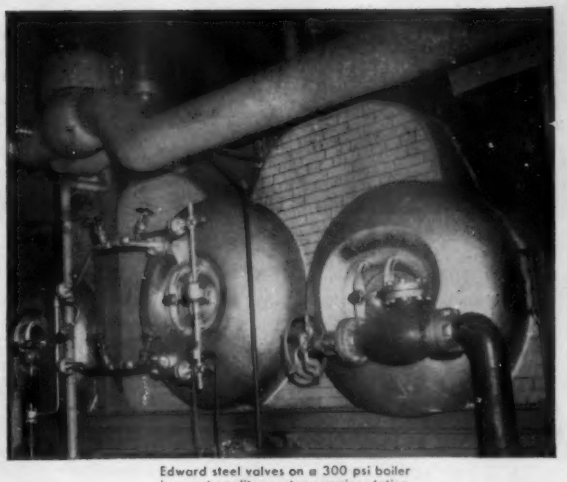

Edward steel valves on a 300 psi boiler in a metropolitan water pumping station.

Pumping Station Uses Edward Valves For Trouble-Free Dependability

LARGE MIDWESTERN CITY BUYS HIGH PERFORMANCE STEEL VALVES TO INSURE FUTURE SAVINGS

Edward gate valves in midwestern pumping station.

Pumping water for a large city is an operation that requires dependable equipment.

To insure against valve failures, this large midwestern pumping station uses Edward steel valves in strategic locations on all boiler and pump piping. Although the boiler is rated for 300 psi, steam pressures in many services are low enough to permit cast iron or bronze valves. Nevertheless, Edward steel valves are used for long range economy and dependability.

Often just the labor to repair or replace valves costs much more than the valve. Therefore, cost conscious engineers are specifying Edward even for 100 to 150 psi service.

You too can cut valve repairs and replacements while getting the extra convenience of trouble-free dependability. Install Edward steel valves for water, oil, gas, steam and other fluid services. The added quality more than justifies the slight additional cost.

Buy Edward for new installations. Buy Edward for replacement. High performance Edward valves will save you money today and throughout the life of your plant.

Write for the Edward condensed catalog or contact your nearest Edward representative.

Rockwell-Built EDWARD Valves

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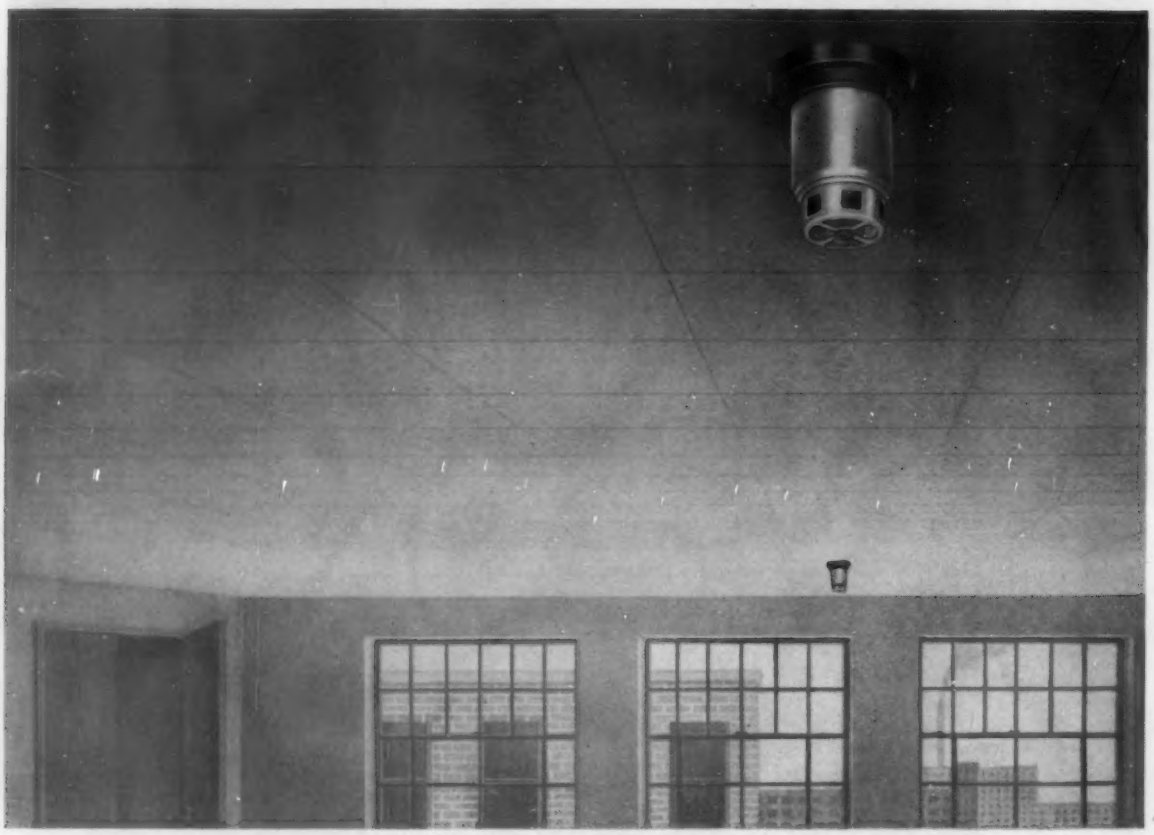

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5-ton, 3-runway, 50-ft. span, completely motorized Cleveland Tramrail bridge operated by pushbuttons from floor. Bridge is shown interlocked with track extending out doorway over railroad. This Tramrail system has been in service since 1943.

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Obviously with total savings running in the neighborhood of $5,000 yearly, it did not take long for this Tramrail installation to pay for itself.

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WHAT'S NEW IN MOTOR CONTROL? ★ ★ ★ GET IT FIRST IN CUTLER-HAMMER

Now industry's three-phase motors can have full three-phase protection with standard in-stock motor control!

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The use of three overload relays is not new. Many industrials plagued by recurring motor burn-outs and the resulting intolerable operating interruptions have changed to three-relay control. But such changeovers have been slow to effect and costly as no standard control was available with three overload relays. Special constructions and enclosures have always been required.

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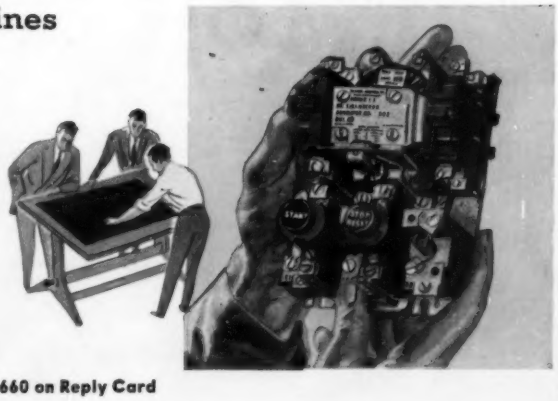

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The magazine that helps plant engineers with their everyday problems